THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

Recovering Fine Sand
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Cement Grinding Mill Uses
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Dust to Kiln Firing End
In New St. Lawrence Plant page 82
Produce Expanded Perlite
In Automatic Plant page 146



Grinding mill department of Drogon Coment Co., Northampton, Pann.

ANNUAL CEMENT ISSUE

AUGUST 1955



Here's a New Way to Drill Rock - for Lower Costs

... use a CLEVELAND DR79 Dual Drill Rig with quarry-bar stability and full-powered flexibility that cuts drilling time!

The Cleveland DR79 Dual Drill Rig consists of two arms, specially designed to give you quarrybar stability for faster drilling.

The arms are twelve feet long and provide a 94-inch feed travel for the 4-inch drifters. Each arm is completely mechanized, too, to give the maximum flexibility needed for proper hole spacing. For example, all movements are air-powered—the lift and swing by air-motor, mechanical-screw arrangement, and the drifter feed by air motor and chain.

You can get practically any drilling pattern you want. Here's why — the arms raise 30° above horizontal and lower an equal amount. They also swing a full 120°...30° inside of center and 90°

outside. Complete spread of the arms is 31 feet and permits drilling nine holes on 6-foot centers from one setting. Moreover, you can drill at any angle from vertical to horizontal.

Along with complete flexibility, you get ease of operation. All controls are grouped at each operator's station, and each arm is independent of the other. Remote controls can be furnished if desired.

Mount the Cleveland DR79 Dual Drill Rig on any D8 or similar tractor. The results will be less operator fatigue, fewer and faster setups, more holes drilled per man shift — and lower costs. Write for chart showing complete range of drilling patterns.



CLEVELAND ROCK DRILL DIVISION

12500 BEREA ROAD CLEVELAND 11, ONIO

RESEARCH REEPS B.F. Goodrich FIRST IN RUBBER



Here comes uranium for the atomic submarine

A typical example of B. F. Goodrich improvement in rubber

OUT of that hole comes the power-ful stuff that will make atomic fuel. Climbing up the narrow, twisting tunnels of the uranium mine are trucks so small and compact that there's no room for clutch and gears. Instead they use V belts to run them. But for a while this type of truck wasn't practical because the belts kept breaking. They sometimes lasted only a few days.

All kinds of belts were tried but they couldn't stand the jolting starts and stops, heavy loads, rough driving. Some would snap like pieces of string.

Then the manufacturer heard about

Grommet belts invented by B. F. Goodrich engineers. The grommets are two extra strong cord loops inside the belts, like twisted cables except they're endless. High-capacity Grommet belts were put on the trucks. They're so much stronger they last months instead of days.

Product improvement like this is always going on at B. F. Goodrich. New ways are constantly being found to make V belts, conveyor belts and hose work better, last longer. No product is ever regarded as "finished" or standardized.

How this cuts your costs: Biggest cost savings come almost always from top performance rather than lowest prices. If you use rubber products, remember B. F. Goodrich is one company that will never lower its quality standards. This means you can be sure of top performance and real money savings when you buy from your B. F. Goodrich distributor. The B. F. Goodrich Company, Dept. M-451, Akron 18, Ohio.

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THE STREET RECOGNIZED AUTHORITY

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

August 1955







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What does the man behind the wheel think of EASTON? Is his opinion significant? Let a typical EASTON driver tell what he thinks...

EASTON has made this kind of driving easy. With EASTON it's straightaway driving all the time...I see where I'm going. I don't have to operate a hoist dumping a load that I can't watch. With EASTON I drive straight in... the overhead hoist takes over while I wait. I drive away in a straight-on loop back to the shovel.

With EASTON I make more trips with less effort and less wasted time. Riding is smoother and softer with EASTON because more than half the load is carried back on the trailer axle. At the end of a long day of fast driving with heavy loads I feel less tired, more alert, safer with EASTON.

What do I say about dependability? Just this – for steady going through years of the hardest kind of service I'll take EASTON over anything else you want to name.

YOU CAN'T BEAT THIS COMBINATION!

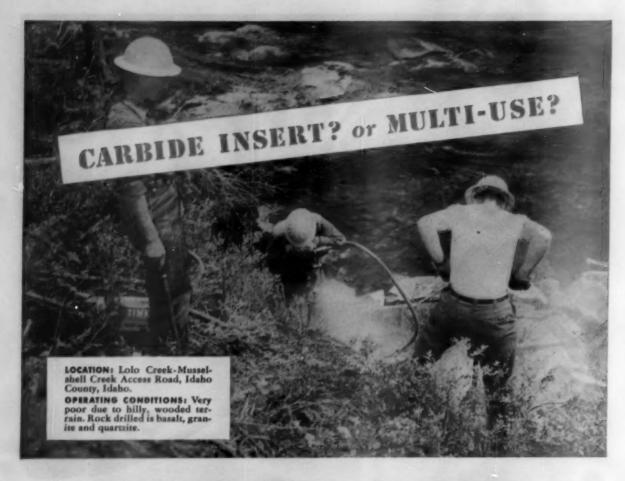


It's the famous EASTON doorless pan trailer and exclusive EASTON electric overhead dumping system. Dependable overhead dumping is essential! Trailer capacities, 10 to 36 tons.

You are invited to check the above comments with any driver of EASTON trailers.

Also, Easton will always welcome an opportunity to make a competitive survey when the aim is to provide a better transportation system for mines or quarries.





Twin Feather Mills Inc. chose TIMKEN° carbide insert bits for tough job on Idaho access road

HERE'S a tough drilling job in anyone's book. The project: a thirty-mile access road to reach rich timber lands. The terrain is hilly and wooded and blast holes must be drilled into basalt, quartzite and granite. Twin Feather Mills Inc. chose Timken's carbide insert bits for the job.

Timken carbide insert bits are most economical for small-diameter blast holes, constant-gauge holes, and very deep holes. And they're your best bet for highest speed through hard and abrasive ground.

For drilling in ordinary ground, you get the biggest savings with Timken multi-use rock bits. With correct and controlled reconditioning, they give you lowest cost per foot of hole when full increments of steel are drilled.

Both types of Timken rock bits are interchangeable on the same steel. Dozens of different bits fit the same steel! Drillers can change bits on the job in just a minute. The need for large stocks of drill steels is eliminated.

All Timken rock bits are made of electric-furnace Timken fine alloy steel. A special shoulder union protects threads from drilling impact. For help in choosing the best bit for your particular job, call on the Timken Rock Bit Engineering Service. There's no obligation. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



Timken threeded



Timken threaded Carbide insert rock bi

your best bet for the best bit ... for every job TIMKEN

Another NORTHWEST Model 41 goes to work!

THIS MAKES 14 NORTHWESTS for ROWE CONSTRUCTION CO.
BLOOMINGTON, ILL.

Here is another of the many Northwest Model 41s going to contractors all over the country. This one makes the 14th Northwest bought by Rowe Construction Co. of Bloomington, Ill. Remember, the Model 41 is a full 1 yd. machine built as a 1 yd. from the ground up.

As a Dragline Northwest brings you a combination of advantages that let you get the most out of a job. Northwest Crawlers have been proved in miles of travel and Northwest Steering means easier handling in the rough conditions so often present in dragline work.

The "Feather-Touch" Clutch Control reduces the fatigue of a long day without resorting to complicated, delicate mechanisms. Simplicity of design assures ease of upkeep and reduces down time for adjustment and repair. Uniform Pressure Swing Clutches assure smooth, accurate, fast spotting of the bucket. The Cushion Clutch eliminates the shock overloads before the overload reaches the operating machinery.

These are just a few of the advantages that make your Dragline jobs easier. They are advantages you should look into now. Plan to have a Northwest. Let us tell you the whole story.

NORTHWEST ENGINEERING CO. 135 South LaSalle St., Chicago 3, III.

NORTHWEST

SHOVELS . CRANES . DRAGLINES . PULLSHOVELS

Convertible for any Mining Material Handling or Excavation Problem

TRAYLOR TY REDUCTION CRUSHERS

feature compact design that combines maximum strength with peak operating efficiency. Traylor's original, non-chokable Bell Head and Curved Concaves are an unbeatable combination for meeting rugged, 'round-the-clock production schedules. Available in six sizes with feed openings from 3" to 22".

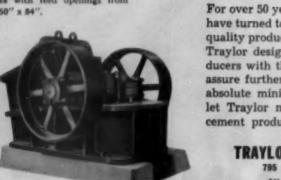


economies as Traylor Kilns.



TRAYLOR ALL-STEEL JAW CRUSHERS

feature Curved Jaw Plates that reduce choking and packing to boost capacities and lower maintenance costs. By reducing lifting and churning of material in the crushing chamber, Traylor Curved Jaw Plates outlast ordinary straight plates 3 to 1. Traylor Jaw Crushers are available in five types with feed openings from 8" x 12" to 60" x 84".



For over 50 years, the world's leading cement producers have turned to Traylor for machinery to produce higher quality products with lower processing costs. Exclusive Traylor design features not only provide cement producers with the highest degree of product control, but assure further savings by reducing maintenance to an absolute minimum. Take a tip from the leaders . . . let Traylor machinery put concrete savings in your cement production.

MACHINERY

TRAYLOR ENGINEERING & MFG. CO.

SALES OFFICES: New York . Chicago . San Francisco Carnellon Mire: Carnellon Viskers, Ltd., Montreal, P.O.

A Traylor LEADS TO GREATER

TRAYLOR ROTARY KILNS

feature the super-strong rigidity of all-welded, steel shells plus the convenience of easily adjustable supports . . . features that assure perfect alignment, cut maintenance costs and reduce power requirements. All Traylor Rotary Kilns are "Traylor-Made" to the exacting requirements of the specific installation.



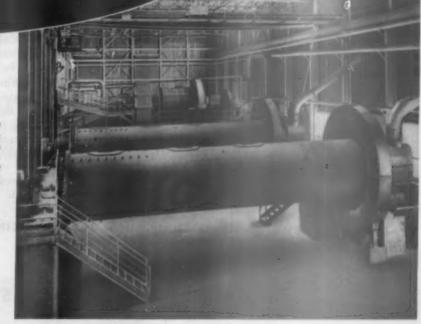
Puts Concrete Savings Concrete Production in Cement Production

Descriptive literature on all Traylor Machinery outlining design features, operating features, specifications and capacities is available for your information and guidance. A request, stating your specific interest, will bring a free copy of the appropriate booklet to your desk promptly.

TRAYLOR GRINDING MILLS

have long been regarded as the accepted standards of modern grinding mill design. Available in sizes to meet practically every requirement. Offered in a wide variety of types, including: Rod, Compartment, Ball and Tube Mills.







Welder is shown welding a "wear-sharp" repointer to the shank of a dipper tooth using the Amsco MF and flux.

HARDFACE WITH THE AMSCO® MF

for manual flexibility . . . plus machine speed and accuracy

The Amsco MF combines the visibility and craftsmanship of hand welding with the automatic advantages of machine work. Speed of hardfacing increases because the Amsco MF uses small-diameter electrode and high-current densities which allow the operator to maintain a high deposit rate. The electrode feed is continuous—and automatically regulated—to maintain a constant arc. Thus, the machine automatically compensates for operator movement or an irregular welding surface.

Cost of deposited metal is less! The Amsco MF uses coiled, bare mild steel electrode. It feeds through the flux hopper (the cone). There it is magnetically coated with your choice of manganese steel build-up or hard-facing alloy which is carried in the flux. You coat your electrode as you weld at considerable savings in deposit cost.

The machine is portable. It plugs into any standard welding unit, and requires no special setup. See a demonstration of the Amsco MF's speed, quality of weld and uniform deposit. Try it yourself and discover how easy it is to operate. Your Amsco Distributor is ready to show it to you now. Welding products are distributed in Canada by Canadian Liquid Air Co., Ltd.

make your Amsco Distributor HARDFACING HEADQUARTERS

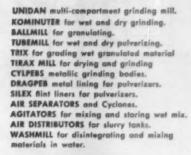


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Chicago Heights, III.

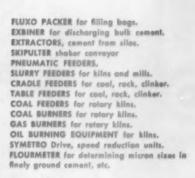
SMIDTH...

Machinery For Cement - Lime - Ores

F. L. SMIDTH & CO. Manufacture the following Complete Line of Modern Machinery for Coment, Lime and Allied Materials, the Sintering of Ores, etc.



ROTARY KILNS for cement, lime, ores, etc.
UNAX KILNS, with integral cooler.
ROTARY KILNS—Sintering and roesting.
PRE-HEATERS for rotary kilns.
UNAX COOLERS, cooling drums on kiln.
UNAX PRE-COOLER, air quenching.
UNAX GRATE COOLER, air quenching.
COOLERS, Cement, Ores, etc.
CHAIN SYSTEM for wet kilns.
HEAT EXCHANGERS for dry kilns.
KILN CONTROL, electrical.
GAS ANALYZER, electrical.
KILN EQUIPMENT, fans, hoods, dampers, spouls, airseals, dust chambers, multiple gas discharge.



Plant Engineering

F. L. Smidth & Co. are also engineer specialists in designing and equipping factories for making Portland cement and other allied materials, having devoted their efforts along these lines for a period of over half a century.

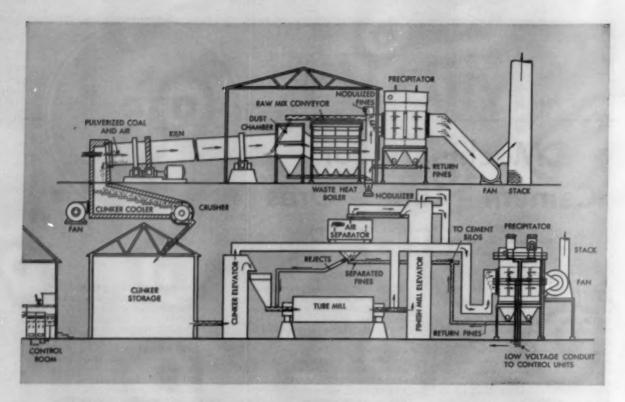
Engineering services include all stages of the project from the preliminary investigation of the site and raw material deposits, chemical and physical tests of the raw materials and finished product, to all necessary drawings and specifications for erecting and equipping all departments of the plant, including also the electrical engineering.

Modernization

This service applies equally well to complete new plants or any special department of a plant—to revisions or conversions of existing plants—making standard Portland cement, slag cements, white cement, or for making special high early strength cements.

For Smidth Machinery apply to:

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- F. L. Smidth & Co., Ltd., 105, Piccadilly, London, W. 1, England
- F. L. Smidth & Co. (Bombey) Ltd. 42 Queen's Road Bombey, India



How dust collecting problems are handled in the modern cement plant

The "why" of the Cottrell precipitator is well known to coment plant personnel—its use in nuisance abatement and cement dust salvage is well established. These diagrams explain the "how" of the Cottrell, including its familiar application to kiln gas and, more recently, its use in the ventilating system of the finishing mill.

Klin Gas

The upper half of the drawing shows a Cottrell for cleaning kiln gases. They are first passed through a dust chamber to the waste heat boiler and from there to the electrical precipitator, where the dust is removed. Salvaged dust is returned by conveyor to the process. The cleaned gas is discharged to the atmosphere through an induced draft fan and the stack. (Wet process kilns may also be fitted with Cottrells).

And In The Finish Mill

Dust from the grinding mills has always been a major problem. The lower half of the diagram shows the recent application of the Cottrell for cleaning finish mill ventilating system gases. Cement dust is collected from the ventilating system serving the separators, conveyors and elevators. As before, recovered dust is returned to the process.

Separating Small From Large Particles

When large particles of low alkali content must be separated from very small particles of high alkali content, an integrated mechanical-electrical precipitator will do the job effectively. The mechanical element handles large particles, and the electrical element collects the smaller particles that escape it.

Rapping Puffs Eliminated

With Research-Cottrell's electronically controlled Magnetic Impulse Rappers, there is no need for rapping shutdown periods or dampers. Automatically controlled and operated, the MI Rappers continuously rap the electrodes throughout precipitator operation, thus avoiding dust re-entrainment in the gas stream and assuring optimum precipitator performance at all times.

Many Design Advances

The MI Rapper is one example of many improvements that have taken place in the design of precipitators and their associated electrical equipment. Forty years of experience have provided Research-Cottrell with a rich store of engineering skill-it is this skill that has evolved the modern Cottrell precipitator, embodying a design based on knowledge gained through more than 2000 precipitators in many different fields. Fourteen of these have been installed or are under construction for cement plants. All of these precipitators were custom-engineered to individual specifications.

For a more complete description of the Cottrell precipitator, write to Research-Cottrell for Bulletin GB.

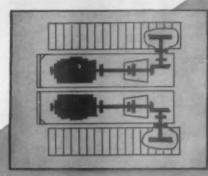
RESEARCH-COTTRELL, INC.

A Wholly Owned Subsidiery Of Research Corporation MAIN OFFICE AND PLANT: BOUND BROOK, N. J. 405 Lexington Ave., New York 17, N. Y. Grant Building, Pittsburgh 19, Pa. • 228 N. La Salle St., Chicago 1, Ill. • 111 Sutter Bldg., San Francisco 4, Cal.

Biggest Tractor News in Years... the "Euc" TC-12

Twin Crawler

Here's a completely new concept of crawler tractor design and performance... the new TC-12 Twin Power Euclid. It's designed and built to give you all the features you want in a tractor—more power, easy operation, greater workability and accessibility for servicing... and all power train components are matched, with years of application in earth moving equipment.



Twin Engines— 365 h.p. delivered to power train

SPECIFICATIONS

total h.p. -- 388 h.p. at rated speed available for tractive affort -- 365 h.p. speeds -- 3 speed ranges forward and reverse to 8.3 mph

drawber pull (bere tractor)-

forward and reverse 54,000 lbs. low range 53,500 lbs. intermediate 53,000 lbs. high range

	Walnut may man be heard
track width (standard s	(hoo) 26
track gauge	110
overall width	11'4
overall length	16' 2
height (excluding steel	(m) 7' 11'
drawber height	23
ground clearance	20
constine weight there	a) opposer, 58,000 the

Powered by two diesels with separate Torquatic Drives for each track, the TC-12 has 365 h.p. available for tractive effort—a smooth steady flow of power to meet any job requirement. There's no master clutch and no manual gear shifting . . . the operator simply moves a lever to select one of three speed ranges—forward and reverse—for travel speeds up to 8.3 m.p.h. Maximum drawbar pull is equal to, or greater than, the weight of the tractor and any attachments.

Each half of the tractor is separate and free to oscillate on a single transverse shaft. This gives the TC-12 maximum stability and traction on rough ground. The tractor can be easily separated into two halves for shipment when necessary.

Never before so much workability!

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio



Euclid Equipment

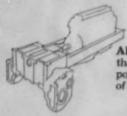
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GENERAL

Allis-Chalmers presents the new

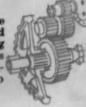
ANOTHER BIG STEP AHEAD IN LOW-COST DIRT MOVING

... with all the important performance advantages of Allis-Chalmers advanced basic design ... tested and proved over millions of operating hours!

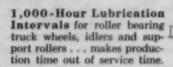


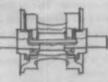
All-Steel Box-A Main Frame that soaks up shock loads, makes possible the service simplicity of unit construction.

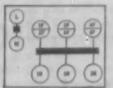
Exclusive One-Piece Steering Clutch and Final Drive Housing with all final drive gears straddle-mounted on tapered roller bearings to insure long life.



Unit Construction lets you remove engine, master clutch, transmission, steering clutches and final drives without disturbing adjacent parts.







Dual-Range Constant-Mesh Transmission lets you go from any forward speed to any reverse speed by shifting only one lever. Eliminates double shifting! That means faster work cycles . . . more production! plus . . . these great new features:

New Allis-Chalmers Diesel Engine with "follow-through" combustion and tornado turbulence . . . for smooth engine performance, cleaner combustion, extra long engine life.

New Wrap-Around Radiator Guard used as dozer lift frame to simplify design, reduce cost of bulldozer; guard tilts forward for easy service.



New Master Clutch with Ceramic Lining sets new standards of clutch life . . . with fewer adjustments required.

New Operator Convenience including roomy, flat platform...foam rubber seat...24-volt direct electric starting...60-gal. fuel tank.



Tough New Track — New design, through-hardened with extra toughness for long life even in severe abrasive conditions.

PLUS . . . new, all-weather cooling; independent radiator-core mounting; new strength and capacity in final drive gears, shafts and bearings.

NEW STANDARDS OF PERFORMANCE AND LONG LIFE ON A WIDE RANGE OF JOBS

You owe it to yourself to investigate the performance advantages of the HD-11... newest addition to the Allis-Chalmers leadership line. See your nearby Allis-Chalmers dealer now. HD-11

90 net engine hp 75 drawbar hp 20,500 lb

six speeds forward to 5.7 mph three reverse to 4.4 mph

FLLIS CHALLERS



A GOOD BALL

... To Lower The Score In Golf Or To Lower The Cost Per Unit Ground In A Ball Mill

Sheffield Moly-Cop Grinding Balls, continue to turn in the low scores on cost per ton unit ground in mills the world over.

The finer, denser grain structure produced in Moly-Cop Balls by Sheffield's alloyed materials and highly developed heat treating and forging methods gives you the ball that takes a beating longer—and delivers your biggest dollar's worth in grinding efficiency. Many leading mill owners use Moly-Cop. A Sheffield man stands ready to demonstrate to you, in your own mills, why it will pay you to change.

SHEFFIELD

MOLY-COP

OFFER-NOTY SDENUM-ALLOT

Grinding Balls

product of over 25 years

of "Know How."

SHEFFIELD STEEL

ARMCO STEEL CORPORATION

BHEFFIELD PLANTS: HOUSTON KANBAS CITY TULS

Export Representatives: ARMCO INTERNATIONAL CORPORATION Middletown, Ohio

Carbon and Alloy Steel • Ingots • Blooms • Billets • Plates • Sheets • Hot Rolled Bars • Steel Joists
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Plastic and Castable Refractories

A. P. Green Monolishic Refractory Enclosure on Allis-Chalmers Air Quenching

Lower Maintenance Cost In Kiln Hoods, Coolers and Dust Collectors

A. P. Green Plastic and Castable Ref one-piece, monolithic, air-tight refra There are no joints for dust to pene eliminated, and structural strength The use of A. P. Green Monolity Committee Committee special shapes are required.

is finding wide acceptance in all tops coolers. Both monolithic side year on patented cooler enclosures standards. They offer ease of inculation, provision for positive and free to fing anchorage, and joint-free surfaces to resist dust penetration and failure due to bulging and buckling.

In kiln hoods, coolers, and dust collectors of some of today's most modern cement and lime plants, the real and definite advantages of monolithic construction provide longer service, reduced majntenance costs, and higher thermal efficiency, Your A. P. Green representative will show you how you, too, can enjoy these money-saving advantages.

brm a

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patented

A. P. Green offers a complete line of refractory products for the cement and lime industry. Whatever your requirement, for specific recommendations without obligation, contact your local A. P. Green distributor . . . he's listed in the yellow page of your telephone directory.

A. P. Green Monolithic Hood in Modern Cement Plant

> A. P. Green Enclosure of Dust Collector Housing

A. P. GREEN FIRE BRICK COMPANY MIXICO, MISSOURI, U.S.A.

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REFRACTOR

CITIES PRINCIPAL DISTRIBUTORS IN

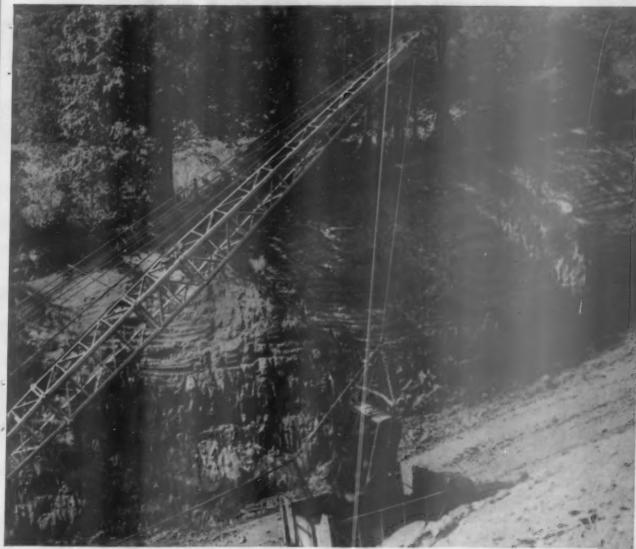
here is a very quick way to determine which crane or excavator offers you biggest production capacity per dollar of equipment investment. Compare machines on the basis of price per pound of lifting capacity.

Remember, lift capacity is work capacity. Obviously, the machine with the heaviest lift rating not only picks up larger crane loads — it also has more strength and stability to handle bigger dragline and clamshell buckets on a wider work range — more power and speed to increase shovel and hoe production.

Check the Koehring lift capacities shown on the next page — then ask your Koehring distributor to give you the figures on price per pound of lifting capacity.

OEHRING COMPANY Milwaukoo 16, Wis.

PARIONS . KWIK-MIX



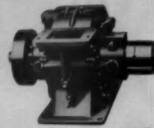
Check price per pound of lifting capacity



KOEHRING	SIZE	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load, Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAPACITY
205 CRAWLER	1/2-Yd.	20,000 lbs.	30-fact beem at 10-ft, radius	?
205 ON RUBBER	%-Yd.	30,000 lbs.	25-feet boom at 12-ft, radius	- 3
304 CRAWLER	%-Yd.	27,800 lbs.	33-feet boom at 12-ft. radius	?
304 ON RUSSER	%-Yd.	50,000 lbs.	30-foot boom et 10-ft, radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-feet boom at 12-ft, radius	?
605 CRAWLER	11/6-Yds.	72,300 lbs.	50-foot boom at 12-ft, radius	3
1005 CRAWLER	21/2-Yels.	159,000 lbs.	50-feet boom at 12-ft, radius	3

*Figures available on request-ask your Kochring distributor for them.

STURTEVANT



LABORATORY SWING-SLEDGE MILLS

Capable of reducing soft, moderately hard and capable of reducing solt, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning. for cleaning.



LABORATORY JAW CRUSHERS

Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 to 400 lbs, per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.



LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited out-puts. Range of output for the 8 x 5 size is from 1/2 in. to 20 mesh — and for the 12 x 12 size from 1/4 in. to 20 mesh.

Laboratory Equipment...

assures accurate samples...cuts laboratory sampling costs

Sturtevant laboratory equipment have all the features of full-sized production machines with extra accuracy and wider range of adjustment built-in. They are fast . . . provide true samples of every batch processed.

All Sturtevant machines have "open-door" accessibility which permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples. Their rugged construction assures round the clock operation with practically no maintenance.

Investigate Sturtevant equipment for your laboratories. They will help you cut sampling costs . . . improve product quality . . . increase sales. Write for catalog, today.



LABORATORY SAMPLE GRINDER

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

STURTEVANT MILL COMPANY

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MULTI-WALL



SHIPPING SACKS

2 to 6 ply plain or printed 1 to 4 colors

Justom-made to fit your specific needs, Kraft Bag Multi-Wall Shipping Sacks render full value in service-deliver full value to your customers... flexible in filling, rugged in handling, tough in transit, they empty c-l-e-a-n, with less dusting or sifting!

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SELF-CONTAINED . SELF-SUSTAINING producing our own pulp and paper and other components in our own integrated plants, at Gilman, Vt. and St. Marys, Ga.

KRAFT BAG CORPORATION

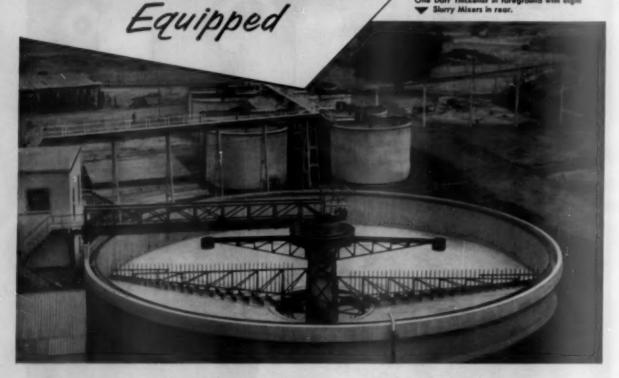
If your product fits into a bag — we'll make the bag to fit your product.

Newest Cement Plant in Asia is

DORR-OLIVER



rr Thickener in fareground with eight Mixers in rear.



The new United Provinces Government Cement Factory, which was put into operation in 1954, is the first closed-circuit grinding plant in India and the newest plant in Asia with a capacity of 3500 barrels per day.

The standard wet process flowsheet is employed using two Dorr Classifiers, eight Dorr Slurry Mixers and two 100 ft. dia. Dorr Thickeners. Three Dorrco Type W pumps and twelve A. C. Wilfley & Sons pumps handle the wet materials. Most of the equipment was supplied by Dorr-Oliver, Ltd., London.

For equipment that will serve you year after year without high maintenance costs, it will pay you to get in touch with Dorr-Oliver Incorporated, Stamford, Conn.; or in Canada, 26 St. Clair Ave. East, Toronto 5.



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Your choice of Kiln Liners for the burning zone of your kiln should be based on their shility to pick up and maintain a sound protective coating under your existing operating conditions.

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To meet your emergency requirements, Canadian Refractories Limited keep a complete stock of MAGNECON Basic Kiln Liners ready for immediate ahipment.



This Kiln always depends on Magnecon Kiln Liners to keep it "on the line".

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GET HIGH QUALITY AGGREGATE from low grade sources

WEMCO HMS (Heavy Media Separation) can remove deleterious material such as shale, chert, soft-stone, wood and coal from low grade deposits. The finished product is specification aggregate universally accepted for concrete that must stand up under severe outside exposure. The cost of HMS treatment can be far less than the transporting of material from more distant sources.

A POSITIVE SEPARATION BY PARTICLE DENSITY ALONE

HMS will work wherever there is a known difference in specific gravity between deleterious material and the desired gravel. It floats one and sinks the other. The separating medium is a suspension of fine magnetic particles in water. It can be adjusted to any needed specific gravity. Make-up costs are only two to six cents per ton of aggregate.

WEMCO MOBIL-MILLS ARE YOUR INDUSTRY'S CHOICE

To date every HMS user in the sand and gravel industry has chosen the Wemco Mobil-Mill. It is a complete plant — pre-engineered — pre-fabricated — and of pre-determined cost. It is so thoroughly proven in design that it operates from the first day. It goes up in minimum time and at minimum cost. Then it knocks down and moves on when the deposit is exhausted. The Wemco HMS Mobil-Mill is available in capacities from 5 to 500 tons per hour.

Write today for further information



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SAVE ENGINEERING TIME... AND MONEY ERECTION

Barber-Greene Conveyors are made of pre-engineered, self-contained, standardised units that are quickly assembled without costly engineering time. Field assembly of miscellaneous pulleys, bearings and dozens of other parts is completely eliminated. B-G Conveyors are as easily disassembled, expanded or relocated—with 100% salvage. The value of these B-G features is in direct proportion to the size and

scope of the conveying job. The bigger the job—the more you will save. Wherever you have bulk handling problems—or are planning to modernise or expand present facilities—investigate Barber-Greene Conveyors. Take advantage of Barber-Greene's extensive experience in solving problems of bulk handling similar to your own. Complete descriptive data is available for handy reference—it's yours for the asking.

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What's Happening

IN OTHER FIELDS OF INTEREST TO THE ROCK PRODUCTS INDUSTRY

August, 1955

- Construction contract awards, in the 37 states east of the Rockies, totaled \$9,-727,562,000 for the first five months of 1955, according to an F. W. Dodge report. This was an increase of 29 percent above the corresponding figure for last year's previous high. Nonresidential building awards amounted to \$3,289,895,000 for the first five months of 1955, a 20 percent increase over the same period last year. Residential building totaled \$4,505,626,000, up 38 percent, and public works and utilities increased 28 percent from last year, to \$1,932,041,000.
- A ready-mixed concrete truck driver, James E. Beckman, Utah Sand & Gravel Products Corp., Salt Lake City, Utah, was named "driver of the year" in the trucking industry's annual competition, for heroism in rescuing four persons trapped in the burning wreckage of a head-on collision. He emptied his fire extinguisher in a vain attempt to check the flames, and then backed his truck up to the burning wreckage and doused it with 150 gal. of "washout" water, used to clean the truck after pouring a load of concrete. Rescue workers were then able to pull four persons, still alive, from the wreckage.
- The 360-mile Pennsylvania Turnpike has received an additional 450 miles of authorized proposed roadway. One measure would be to build a 350-mile "Keystone Shortway" across the northern part of the state from Stroudsburg on the New Jersey border to Sharon on the Ohio line. A second proposal is to link the present western section of the turnpike around Pittsburgh with the West Virginia border. Both authorized additions would be built through the sale of revenue bonds retirable from vehicle toll earnings.
- A world record for pouring concrete may have been established when 6,230 cu. yd. of concrete were poured in a 24-hr. period in construction of the \$100,-000.000 Mackinac Straits bridge at Michigan. Approximately 99,587 cu. yd. of concrete were poured into piers from April 29 to May 28, despite a loss of two days' work due to weather and mechanical breakdowns.
- A four-mile test highway in Oklahoma has been constructed to determine the advantages of asphaltic concrete and portland cement paving. The highway is "checker-boarded" to provide equal driving conditions, and maintenance and accident reports are being kept. Skidding and visibility will be two factors checked in the accident reports.
- Vermiculite is apparently proving useful to "do-it-yourselfers" in a variety of applications, as evidenced by one New Yorker's report. After insulating his attic and starting vegetable seeds in vermiculite, he sprinkled dampened vermiculite on the floor. He claims it works well as a sweeping compound, and is efficient in picking up dirt and keeping dust down to a minimum.

- Two "radiation caves" were built at the University of Michigan, to house radioactive materials from the university's reactor. The rooms have walls of the heaviest concrete ever poured in the state, doors weighing 9 tons each, and windows 3 ft. thick. Ceilings on the rooms are concrete slabs 4 ft. deep, the "wallpaper" is \(^3\mathbb{8}\)-in. steel plate, and electricity for the room flows through armoured conduits. Officials claim that the radium dial of a wrist watch gives off more radiation than can escape from the "caves."
- The tusk of a prehistoric animal, believed to have been either a mammoth or a mastadon, was uncovered at Paint Valley Sand and Gravel Co.'s excavations along Paint Creek in Ohio. The tusk measured 6 ft. long, and 9 in. through the thickest part, tapering to 5 in. diameter. It had been buried some 15 to 20 ft. below the surface, and weighed 110 lb. The company also uncovered several large bones and one tooth which weighed 9 lb., within recent years.
- Three Lima, Ohio, boys, aged 10, 14 and 16 years old, "borrowed" a Western Ohio Stone Co. truck. They had started it by "jumping" the ignition switch with a wire that connected the ignition wires and bypassed the lock. They also were suspected of breaking into the Churchill Construction Co. office, stealing a set of truck keys and driving a truck there around the company yard. The truck had no water in the radiator.
- Steel production set a record for the month when the April, 1955, output totaled 9,815,095 tons of ingots and steel for castings. After increasing steadily for nine months, steel production rose to a rate of about 120,000,000 tons a year during April, 1955, compared to a rate of 78,000,000 tons annually at the low point in July, 1954. If steel production can be considered a barometer of industrial conditions, 1955 may be the best year on record for the industrial economy.
- Approximately 70,000 churches and synagogues will be built or substantially altered in the United States in the next ten years, at a cost of almost six billion dollars, according to an F. W. Dodge report. Also, about 12,500 parish houses, Sunday school buildings and related buildings, costing approximately one and a quarter billion dollars, will be constructed. These do not include parochial school buildings.
- Oolite, a form of limestone, is being dredged and stockpiled by the Brinson Construction Co., Tampa, Fla. The material will be used for road construction in the Everglades national park system.
- The American Road Builders' Association recently recommended to the Senate Finance Committee that legislation to renew the Renegotiation Act carry a provision exempting from renegotiation, construction contracts and subcontracts awarded on the basis of competitive bidding.
- Heavy construction awards, nationally, totaled \$9,424,141,000 for the first 26 weeks of 1955, or 38 percent more than in 1954, and 19 percent higher than the previous record set in 1953, as reported in Engineering News-Record.

For Cooling Hot Cement



Cooling hot coment to temperature: acceptable for bulk shipment or immediate bagging is an important problem to many cement manufacturer.

The FLS Coment Cooler, developed especially to overcome this problem, is externally water-cooled, the hot coment being introduced at the base and conveyed in a thin layer along the cooled interior surface to the top, where it is discharged. Thus an intimale contact is established be-

surface, assuring high cooling efficiency.

In addition to cement, the FLS Cooler is applicable to many other similar dry pulverized materials.

COOL CEMENT

HOT CEMENT

FLS Coolers are furnished in sizes varying from 3' to 6'6" in diameter and from 6' to 18' in height, with capacities up to 265 barrels of cement per hour.

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A real break in breakage!

That's the story in a nutshell-

ROCKMASTER® electric blasting caps at the bottom of the holes in an alternate pattern. Holes loaded alternately with Apex® LV and HV explosives to add to the "one-two" punch. Breakage excellent. A well spread muck pile that makes quick and easy digging for the shovel.

With Twinplex Assembly, you get all the advantages of ROCKMASTER millisecond delay blasting plus extra protection for the legwires. The two caps have their duplex legwires sheathed in a tough plastic tube. This sheath practically eliminates the chance of current leakage and any possibility that the wires might become damaged by falling cartridges or rough stemming material.

Get "Better Blasting"—Atlas' informative illustrated periodical. Let us put your name on our mailing list today.



ATLAS EXPLOSIVES

"Everything for Blasting" ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE

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• Converting the raw building products provided by Nature into the rugged and beautiful works of man requires both vision and skill. It also requires fuel—the unseen factor behind every towering structure. Selecting the right fuel is important.

Along the Baltimore & Ohio are vast deposits of bituminous coal with structure and volatility ideal for producing cement, lime, and brick. Modern mechanization and the easy accessibility of the mines keeps production and transpor-

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We will be glad to advise you on the right kind of coal for your specific need, show you where to find it, and how to burn it. The modern efficiency, economy, and cleanliness of Bituminous will amaze you. Ask our man!

BITUMINOUS COALS





BALTIMORE & OHIO RAILROAD

Constantly doing things - better!

How DECO Testing Laboratory can help producers meet new rigid specifications



SCREEN 1ESTS tell when proper size has been reached for material specifications—can reduce crushing and



CRUSHING TESTS show when the minimum amount of work has been done to meet, size specifications. Establish data for selecting crushing equipment



VISUAL EXAMINATION identifies and clarks fies various material serve as a basis for planning tests



GRINDING TESTS determine the size and type of unit to do the



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SETTLING TESTS duplicate held conditions, determining equipment that is required to pro-

ties and commercial Denver Equipment for crushing, screening, grinding, classification, fletation, cyanidation, magnetic separation, gravity concentration, sumpling, thickening, filtering and drying. Pertable and package plants.

A thorough laboratory test is a "first" for any operator with an impurity or size separation problem caused by material specifications.

If you will send us a representative sample of your material and describe fully your objectives, we will make a preliminary examination and then report to you. Your problems interest us personally. With our many years of experience we may be able to help you.

There is no cast to you for this preliminary examination. We would appreciate the sample being sent to us prepaid (by parcel post if convenient). We hope you will say, "Let's see what they can de for us!"

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Please send me complete details on our engineers working in your test laboratories.

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performance of new SIMPLICITY GRIZZLY-FEEDER draws highest praise from user . . . E. W. Hallett

View showing discharge end of the Simplicity 3' x 10' Grizzly-Feeder.

A year ago Mr. E. W. Hallett, President of the Hallett Construction Company of Crosby, Minnesota ordered a Simplicity Oscillating Feeder with a grizzly deck. In a letter we received from him recently, he says: "That feeder works perfectly, and we have never had one pebble hang up on the grizzly part of it. We are very much pleased with it. I believe that it would feed 700 tons an hour if we were to call on it to do it." This is high praise indeed, but it is praise well directed, for the Simplicity Grizzly-Feeder is a new and important contribution to the mining and quarrying industry.

Cuts costs 50%

This unit combines scalping and feeding in one operation, thus completely eliminating the old type apron conveyor and stationary grizzly. The savings are readily apparent . . . you gain additional plant room and save 50% in operation and meintenance costs. The unit is available in sizes from 2' x 8' to 6' x 12', and in capacities up to 1000 tons per hour. A request to us at Durand or to any of our many sales representatives will bring you full information about the Grizzly-Feeder.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.

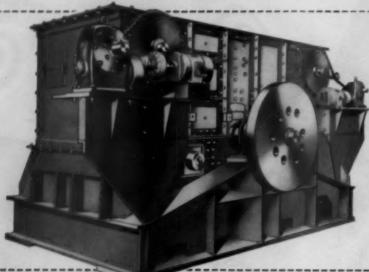
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ENGINEERING COMPANY . DURAND 13, MICHIGAN

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NC Non-clog

Traveling Breaker Plate keeps production going, hour after hour

Regardless of moisture, a BULL-DOG NON-CLOG HAMMERMILL keeps your crushing operation going without clogging or jamming. Traveling breaker plate eliminates build up of material in breaking chamber . . . moving cleaning bar keeps discharge free at all times. You get steady hour after hour tonnage with no costly downtime.

For top performance in cement mill, mine and quarry plant operations choose a BULLDOG. Get a mill that has been designed, engineered and produced by hammermill specialists who have been doing the job better for 35 years. Every BULLDOG HAMMERMILL is "Engineered to your job" for greater output with less horse-power, longer hammer life, minimum maintenance. If you want to make better use of hammermills in your operations . . . consult our engineers. Tell us your crushing problems now.

The Bulldog Hammermill Line

For primary and secondary crushing

- Non-Clog Moving Breaker Plate Hammermills for Wet Materials
- Stationary Breaker Plate Hammermills for Dry Materials.

For secondary crushing and Fine Reduction

· Center Food Hammermills

Capacities 1 to 1000 tons per hour

Recommended for

Limestone * Clay * Shale * Bauzite
Gypsum * Coal * Wood Fibre * Coke
Carbons * Iron Ore * Lime * Fullers
Earth * Phosphate * Mud Balls * Bones
Tankage or any reducible material





Faster, more power, and LOOK, NO CLUTCH!



It's a pleasure to work here!

- Power-shift levers: for Forward-Reverse and High-Low; make any shift while moving in either direction.
- 2 That's no clutch! It's a doublepedal brake, use it with either foot.
- 3 Break-out bucket lever: work the bucket in the pile—you've got two big double-acting bucket cylinders for tremendous breakout power, independent low-level tip back.
- Range Shift: working or travel speed
- 5 Drive Selector: 4-wheel and 2-wheel
- 6 Boom Control

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with more digging power
with faster operating cycles
with easier, safer operation

OU'VE never seen anything like this big new "PAYLOADER" — because there is nothing else like it. Nothing else like it in design — nothing like it in performance.

No other tractor-shovel gives you the tremendous digging power; the ability to get and keep heaped bucket loads under all conditions; the *complete* power-shift transmission which speeds operating cycles; the balance and stability to handle big loads fast, safe and easy.

If you want big, steady output—dependable performance hour after hour, put this husky HO on your jobs and you'll see the difference. Stop in at your nearest "PAYLOADER" Distributor and look it over.

HOUGH-DESIGN

Safety and Stability. Special boom-arm shape and positioning keeps moving members out of operator's reach at all positions. Close, low, load-carry position and longer wheelbase provide stability and balance for fast maneuvering — with safety.

More Horsepower per bucket capacity than other standard models. Either gasoline or diesel power available.

Easy to Operate. Fullest operator visibility for safe, fast maneuvering; power steering; power-shift—no "clutching"; 4-wheel hydraulic brakes—vacuum boosted; foam rubber molded seat and back cushions; seat adjustable for operator comfort; longer wheelbase adds to rider comfort.

Superior Hydraulic System. Sealed, pressure-controlled hydraulic system to keep dirt and air out of oil; double-acting, long-life hydraulic rams with chrome-plated piston rods, and highest quality oil lines and fittings.

Fully-Equipped. Standard equipment includes: builtin headlights, back-up lights and tail lights; 12 volt electrical system for gas-powered units.

Extra Equipment for Greater Usefulness. Bulldozer blade, special buckets, bucket teeth, crane hook and lift fork attachments; snow plows, backhoes and many other useful and special accessories will be available.



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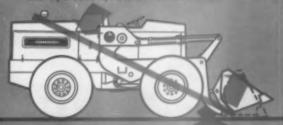
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

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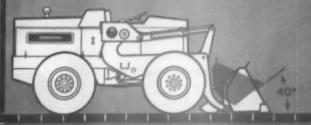
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Tremendous pry-out force is obtained by using the breakout pads on the ground as a fulcrum for leverage. The load forces opposing the pry-out action are thus transferred to the ground through the pads instead of to the axle, wheels and hydraulic system of the machine.



40° BREAK-OUT AT

You can get HEAPED BUCKET LOADS and you get them FASTER and EASIER WITH THIS NEW BUCKET ACTION. Most important of all — you KEEP BIGGER PAYLOADS — because the bucket can be tipped back a full 40 degrees at ground level before it is raised, eliminating spillage.



THE FRANK G. HOUGH CO. 705 Sunnyside Ave., Libertyville, Ill.

Send full information on the new Model HO, 2-cu. yd. "PAYLOADER"

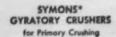
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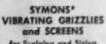
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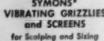
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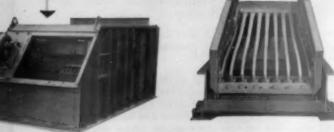
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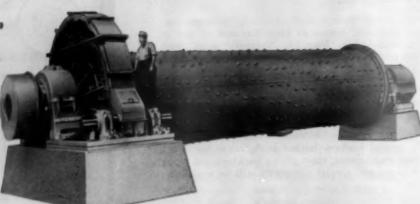






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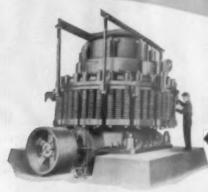
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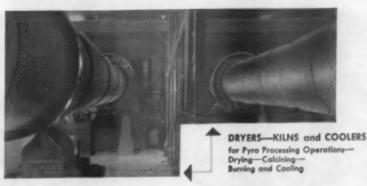
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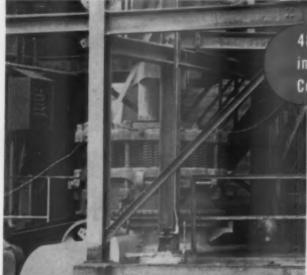
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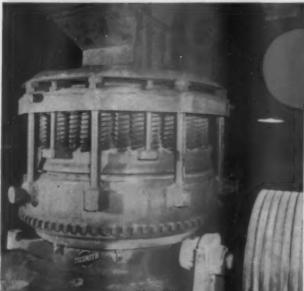
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LS-98 with 60' boom and 11/4 yard bucket works in sand and gravel pit.

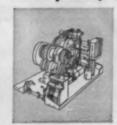
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EDITOR'S PAGE

Cement Supply Should Be Adequate in 1956

R EPORTS OF CEMENT SHORTAGES are coming in from all sections of the nation. Much of the publicity is critical but there is some which recog-

nizes the peculiar problems involved.

Those who criticize, blame the portland cement industry for having been too slow and conservative in providing expanded capacity. In many instances they claim discrimination in the allotment of supplies and the big users—highways, turnpikes and federal construction—are getting preferential treatment. Nearly all have unprecedented demands whether they be builders, contractors, ready mix or concrete masonry producers.

The construction boom in all categories is of enormous proportions and is moving at a ten to twenty percent higher rate than last year's all-time national high. Gains of fifty percent or more are reported in many localized areas over the country. The experts didn't anticipate such a high level of construction in their forecasts a year or more ago, which partly explains shortage of all types of building materials that are now multi-

plying.

Economists believe that the present rate of construction cannot be maintained and they are speculating whether or not the present rush to build isn't a case of borrowing now from future building. Regardless of that, heavy demands for construction are responsible for much of the shortages of building materials. It is nation-wide, with localized exceptions, and all cement manufacturers are not seriously involved.

The mild past winter over most of the country has resulted in uninterrupted demands for cement, causing an early depletion of cement from storage silos. Shortages as a result came as early as May or June in areas where stocks would not be normally exhausted until late summer or early Fall. Thus, from three to five months may have been added to the 1955 construction season.

Effect of the mild winter is emphasized by the case of a ten thousand barrel per day plant in the East. That plant had 330,000 barrels of cement in silos on May first. Two months later, this re-

serve was gone.

The cement industry as a whole accumulates thirty or more millions of barrels in storage during the winter. That amount would be quite a factor in total supply, and certainly would take care of the needs of several entire industries using concrete.

As conditions stand, smaller users of cement in particular are being hurt severely and new customers have little chance under a program of tight allocations. Established cement users may stand to gain on that score, through discouragement of new, small competitors. Many users are

on curtailed operating schedules, and there is general fear that cement shortages rather than lack of money or credit might limit the building boom

and jeopardize general prosperity.

Ability of the cement and concrete industries to improve performance of their products, through air-entrainment and other technological progress, and the development of new products, uses and markets have aggravated the problem. Use of lightweight aggregates in combination with cement has led to development of roof and interior wall markets. The growing acceptance of prestressed structural concrete, asbestos-cement products, concrete masonry and other products, and the use of more residential slab construction have substantially added to demands.

Turnpike construction has unbalanced the supply but that kind of business is temporary with respect to fixed sources of cement supply. Such construction makes peaks in demand for cement but has been rightfully discounted in any long-

range plans for expanded output.

Adverse Effects

The nation-wide criticism in the press is not doing the cement industry any good. Neither are good relations with regular customers being fostered where such customers believe they have been treated unfairly. The cement industry is seeing increasing inroads of foreign cement into critical supply areas, new competition coming into established marketing areas and business being lost to asphalt and other competitive materials. It has held the price line well, to its credit, but increased prices of out-of-area cements are reflecting in higher construction costs which is most undesirable.

Depreciation allowances under the tax laws do not provide for plant building costs, three times as high as they were twenty-five years ago when many of today's plants were built. This has been a deterrent to plant expansion as is the fact that high freight rates must be considered in planning expansion and new production sites for the days ahead when much freight may again have to be absorbed.

The construction climate has cleared itself this year and the industry is embarking on the biggest investment program for expansion in its history. Scope of the program is such that the forces of supply and demand should assume proper balance in the year ahead.

Bron Nordburg

EAGLE WASHING-CLASSIFYING EQUIPMENT Can Do For You What It's Doing For These Ohio Producers



OSTER SAND & GRAVEL CO., CANTON, OHIO, "preduces materials that readily meet state specifications" with their Eagle Double Screw Fine Material Washer-Classifier-Dehydrator and Single Screw Coarse Material Washer-Deweterer. They produce concrete sand, mason sand and various sixings of gravel. The years of experience that go into building Eagle Equipment are paying off for Oster.



CHARLES ZOLLINGER, RITTMAN, OHIO, says "Eagle Equipment is a wise investment. It washes clean and saves fines. Before installation was made delty waste was high due to washing away high percentage of fines." A water scalping-classifying tank and single screwfine material washer give Zollinger the gradations of materials he wants and can sell. This is a dry pit operation, but whether material is excavated or pumped Eagle Washing-Classifying Equipment does the job.



EVANS R. BECK, KENT, OHIO, readily meets state specifications for concrete aggregate. "We produce high quality meson sand and washed gravel for leach bed or filters." Bech's Single Scrow Eagle Coarso Material unit is mounted on wheels for portability. His Single Scrow Fine Material unit is stationary. No two sand and gravel plants are alike, but whatever the conditions may be Eagle Washing-Glassifying Equipment assures economy of operation and maximum profits.



BOTZUM BROS. CO., AKRON, OHIO, has been at it for 62 years. They produce materials for the open market and for their ready mix business. At the plant shown an Eagle Coarse Material unit processes pea gravel and No. 4 "doing a highly satisfactory job." EAGLEngineered Washing and Classifying Equipment fills the bill for any producer. Eagle has the greatest number of installations by far and the broadest line.



ROCKY'S NOTES

NATHAN C. ROCKWOOD

THE MORE ENLIGHTENMENT on port-land cement and concrete that develops, the more important, apparently, is the role of colloidal silica. For it would seem that it is the lattice structure formed by the aggregation of hydrated silicate ions which provides the bonds or cementing virtues of the product. The more we study silicate chemistry, the plainer it appears to us that the lime, alumina and other ingredients are more or less incidental. The same or better cement would probably exist if only the silica framework remained. Experience with the mineral quartzite, which consists of silica grains cemented by dissolved and reprecipitated silica, is proof of the cementing value of silica alone.

Consequently, anyone interested in portland cement chemistry, or in concrete or concrete aggregate chemical reactions, can hardly afford to neglect the study of all the most recent data on silicate chemistry. The latest and one of the most valuable of these new textbooks is "The Colloid Chemistry of Silica and Silicates," by Ralph K. Iler, lecturer on chemistry at Cornell University. The author is a research chemist for E. I. du Pont de Nemours & Co., Wilmington, Del. There are, of course, many industrial uses for silica in various forms, and this volume is devoted to descriptions, preparation and manufacture of such products as silica sols, gels and powders. References to the silicate gels developed in portland cement hydration are practically nil; however, that does not imply that the same kind of chemical reactions are not involved, but rather that portland cement chemistry has not made contributions of sufficiently general interest to the broader aspect of silicate chemistry to attract the attention of other silicate chemists.

Subjects Covered

The best way to gain an insight of the book's contents is to list the chapter headings, after which we will refer specifically to some details that obviously bear directly on the chemistry of cement. The contents cover: the silica-water system; the soluble silicates; the chemistry of silicic acid; esters of silicic and polysilicic acid; colloidal silica; amorphous silica gels and powders; colloidal silicates; surface chemistry of silica and silicates; silica in living organisms. There are, of course, as the author points out, a great deal yet to be learned about the chemistry of silica, but it appears to us that the important thing is that in portland cement we probably deal very little with single ions of silica—the detached silica tetrahedron

but always with aggregations of these. The reason is that when ever these single ions exist, even in dilute water solution, it is nearly impossible to keep them from joining up to form aggregates of at least colloid dimensions.

Most descriptions of completely hydrated portland cement gel designate it as composed of spherical particles, somewhere around 100 Å (Angstrom units—0.01µ micron) in diameter. The particle size of colloidal hydrated silica composed of aggregations of

varies according to the way it is made, but it too occurs most generally in spheres of about that average size. These are usually very porous, and the pores are normally filled with water. The strength of the bond between the water, or the OH ion part of the water, depends on the size of the pores; where these are extremely small the water is strongly bonded. The spherical particles themselves are made of three-dimensional lattices of silica tetrahedrons more or less randomly joined by Si-O-Si or siloxane bonds. The ordinary conception of the gel structure as a whole is therefore of porous spheres with various degrees of loose packing, with both linkages and open spaces and channels between. In this book various methods are described for affecting either loose packing or tight packing, of small or large particles, depending on the character of the products desired. The starting point is usually soluble sodium

Why Gels, not Crystals?

We have never seen in the literature of cement and concrete any explanation of why gels are formed when cement is hydrated and not crystals, as would be expected if the usual theory is accepted that the silica and lime go into true solution before reacting with one another. We could never bring ourselves to accept that theory entirely because both lime (oxide or hydroxide) and silica are only very slightly soluble in water, and for a "chain" or continuous reaction to account for the formation of a calcium silicate would apparently take very dilute solutions and a long time. Bonds in some of nature's minerals are formed by silica or silicates deposited or precipitated from solution, but it required thousands or perhaps millions of years to accomplish it. To be sure, silica dissolves more readily in an alkaline water solution than in pure water, but any such alkaline (lime) solution encountered in concrete practice is much too concentrated to hasten the process of solution; indeed a saturated Ca(OH), solution delays solution of silica, although a soluble alkali solution promotes it.

In the book before us is a logical explanation of why hydrating portland cement cannot produce crystals, at least under the conditions that exist in commercial mixing and placing of concrete-even if it is possible in reactions between very dilute solutions of silica and lime. Our author explains this as follows: "In view of the fact that essentially all natural silicates are crystalline, it is of interest to consider why most synthetic silicates are amorphous when precipitated from aqueous solution. In a crystalline metal silicate [such an example as sodium or calcium silicate) metal ions and silicate ions of uniform size and shape are arranged in a regular manner in a solid lattice, or framework, characteristic of the ionic sizes and charges. However, most solutions of soluble silicates do not contain silicate ions of uniform size, but, instead, a mixture of polysilicate [groups of] ions, some containing up to 5 or 10 SiO, units each. Even in the case of highly alkaline metasilicates, which are known to contain monomeric [single] silicate ions, lowering of the pH upon addition

(Continued on page 138)



DRILLING 70' TO 80' OF 3" HOLES PER HOUR IN HARD LIMESTONE, ON 7 GALLONS OF FUEL: Marble Cliff Quarries, one of Ohio's largest, is using this Jaeger Rotary 600 on these two quarry rigs with 4" drills and air tugger hoists to drill 19' holes of 3" final diameter in

hard flux limestone. Because of the constant, unfluctuating 100 lbs. pressure maintained by the Jaeger Rotary, each drill averages 350' to 400' per 10-hr. day. The compressor never runs faster than 1600 rpm, with a resulting minimum of wear and fuel consumption of only 7 gph.

Jaeger offers a fully efficient rotary "600"

In more than a year of use, on all types of big air work, the Jaeger Roto "600" has demonstrated two outstanding advantages over other rotary compressors. (1) It operates at slower speeds, resulting in lowest fuel consumption and longest life of engine and compressor. (2) It maintains 100 lbs. minimum pressure under all normal operation, as smooth as steam. Speed modulation is stepless over the entire operating range, and so instant-acting as to prevent any over-run and racing of engine. Controls are also extremely simple.

Jaeger also offers more efficient oil cooling, closer control of engine water temperature, elimination of cold weather "dry starts", 8-hour fuel tanks, wrap-around bumpers and many other advantages. For complete information, see your Jaeger distributor or send for Catalog JCR5.



Model "125" rotary is also available for smaller work.

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LABOR RELATIONS TRENDS

By NATHAN C. ROCKWOOD

Employer Not Liable for Traffic Violation Fine of Employe

THE DECISION OF THREE ARBITRATORS in a case involving a traffic accident is interesting from several angles, both in determining the extent of the employer's liability and in showing the odd kind of cases that can develop over interpretation of labor contracts. The case involved the Virginia-Carolina Chemical Corporation and the International Chemical Workers Union, Local 36, A. F. of L. The three arbitrators represented the company, the union and a chairman agreed upon by the other two. The decision is of record as of April 13, 1955. It involved other issues not referred to in what follows:

Facts in the Case

The chairman of the board of arbitrators states these facts: "A truck was assigned to the pit crew which was near the location of the dragline. It had been the practice for the dragline helper to use the truck when ever necessary. In this case the helper was requested to get some tractor fuel to clean the dragline, and he used the truck for transportation. On the way to the fuel drum it appeared that the brakes were in questionable condition. After he left the fuel drum, the helper (truck driver) discovered that the brakes had failed. Nevertheless he continued on, delivered the fuel, and on the way back to where the truck should be left he had an accident, which occurred as follows: he came to a T-intersection, entered it and swung beyond the center line, sideswiping a car going in the opposite direction from that of the truck turn. He was fined \$10 for failure to yield the right of way. The grievance was filed (by the union) to recover \$10.

"The union argued that if a man is ordered to drive a truck, or if it is customary for him to drive a truck, and such truck was in poor mechanical condition, the man should be protected. In this case, when the employe started out the brakes of the truck were spongy; subsequently they failed. The accident and the fine were a result of the poor condition in which this truck was maintained and therefore the employe should be protected.

"The company argued that as a matter of policy it does not undertake to reimburse employes for personal violations of traffic laws. Even assuming that the brakes were in poor con-

dition or had failed completely, the employe knew it and should have acted accordingly. Either the employe should have parked the vehicle because it was unsafe and walked back, or else, if he drove it, he knew that the brakes had failed and should have driven accordingly. When he came to the intersection he should have gauged his speed so that he could negotiate the turn without difficulty. Instead, he failed to keep the truck under control and swung beyond the center line, thereby causing an accident. In this case something was wrong which the company had not intended to be wrong; anyone who operated or who ordered operated a piece of equipment in poor mechanical condition was at fault if an accident resulted.

Discussion

"At the hearing both parties indicated their concern with the general problem of safety, and, in addition to deciding this grievance, the Board of Arbitration was requested to lay down some general guides as to both company responsibility and union responsibility in such matters.

"The collective bargaining agreement contains the following paragraphs with respect to the matter of safety:

"'11.1.1 Section A: Safety and Health—(1) The company shall continue to make reasonable provisions for the safety and health of its employes during the hours of their employment. The union agrees to cooperate with the company to maintain and promote safety and health among the employes.

"'11.1.2 (2) The company agrees to continue, and extend when necessary, its present practice of providing reasonably necessary sanitary facilities and protective clothing and equipment on jobs where such protective clothing and equipment are necessary.

"11.1.3 (3) The company solicits active support from the union in its safety program. The company agrees to appoint a safety committee composed of employes who are union members for each department to bring to the attention of the company safety director unsafe conditions and to make recommendations to the company for improvement and to encourage safe working practices.

"'11.1.4(4) Available transportation shall be furnished at all locations for

transportation of any men injured on iob.'

"These provisions may have some general value. However, their effectiveness, without implementation, is questionable. It did not appear during the hearing that the company had ever promulgated any plant safety rules. But even assuming that it had promulgated such rules, they did not cover the facts of this grievance, which involved defective equipment. From the general submission of both parties for some guides as to responsibility, it would appear that whatever rules may have been promulgated were few and inadequate.

"Part of the responsibility of the company to make provision for the health and safety of its employes would include the promulgation of plant rules to meet the particular needs of the plant. Even after such rules had been promulgated, part of the responsibility of the company to make reasonable provision for the health and safety of its employes would include the establishment of appropriate machinery for the administration of such rules. The realities of the employment relationship require such administrative machinery both for the protection of the employes and the company. Except in those clear cases where there cannot be any reasonable dispute, it is doubtful that the parties would agree to leave to the judgment of employes the determination that a health or safety hazard existed and, therefore, to stop work or to change working conditions. Except in those clear cases, the employes are entitled to have the company, through its supervisory employes, make a quick decision on health and safety matters and to assume the responsibility for such determination. On the other hand, it would be the responsibility of the employes to observe such plant safety rules and of the union to encourage employes to observe such rules; failure to observe such rules would be a proper basis for disciplinary action by the company.

"From the union's description of the type of work performed in the particular area and the conditions to which the mechanical equipment was subject, it appeared that sudden brake failure occurred frequently. Such sudden brake failures were no fault of

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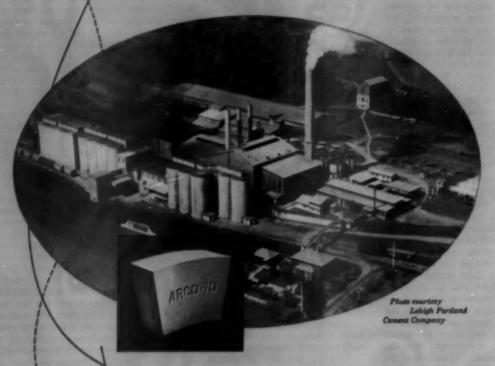
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We can now supply Grefco's superior quality high alumina brick from our works at Orviston, Pennsylvania, as well as from Danville, Illinois. These include Grefco's well-known ARCO and ARCO-70.

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PEOPLE

IN THE NEWS

U. S. Gypsum Superintendents

J. R. Burns, works manager of the Shoals, Ind., plant of United States Gypsum Co., Chicago, Ill., has announced the appointment of the following superintendents at the Shoals plant: Joseph L. Haywood, formerly at the Sweetwater, Texas, plant, has been named mill superintendent; James H. Scott, formerly at Heath, Mont., has been appointed board superintendent; Arthur D. Soderberg, formerly at Heath, Mont., has been made quality superintendent and A. G. Whitelaw, formerly at Hagersville, Ont., Canada, office superintendent. William E. Watkins of Chicago and Norman A. Fowler of Atlanta, Ga., have been temporarily assigned to the Shoals plant as technical managers; and Robert A. Koy, personnel superintendent at Genoa, Ohio, has been temporarily assigned to Shoals to direct safety activities.

Production Executives of St. Lawrence Cement Co.

DR. BERNARD ULRICH, general manager of the St. Lawrence Cement Co., Villeneuve, Quebec, Canada, has had world-wide experience in the cement industry. He is a graduate civil engineer of the Swiss Federal Institute of Technology, Zurich, Switzerland After working on construction projects in Europe and North Africa, he went to Eeerste Nederlandsche Cement Industrie (ENCI), Maastricht, Hol-



Dr. Bernard Ulrich



George Zulauf

land, in 1950 as resident engineer. He began work on the Villeneuve project in 1952. Dr. Ulrich organized the entire staff of St. Lawrence Cement Co. and was responsible for construction



Dr. Alfred Schneider

of the plant. His headquarters are at Villeneuve. P. Chapdelaine is secretary-treasurer and J. Longy is sales manager.

George Zulauf, production manager, joined the Holderbank organization in 1948 and served as project engineer for cement plants in Europe and Africa. Previously, he was associated with a portland cement operation in eastern Europe. A graduate mechanical engineer of the Swiss Federal Institute of Technology, Mr. Zulauf was chief

engineer during construction of the new plant. Hans Ruegger will remain to assist Mr. Zulauf.

Dr. Alfred Schneider, chief chemist, started with Holderbank in 1952 and his assignments as consulting engineer have taken him throughout Europe, South Africa and South America. A graduate chemical engineer of the Swiss Federal Institute of Technology, Dr. Schneider joined the Quebec plant in 1954. He has trained the local lab-



Jan Simons

oratory and operating staff in cement chemistry and plant control. Jean Laneuville, chemical engineer, is assistant chief chemist.

Jan Simons, maintenance superintendent, served in similar capacity for 15 years at ENCI, Holland, where he supervised construction of a new plant in 1951 and 1952. He also served in that capacity at Villeneuve.

A. W. Dann Retires

A. W. Dann, executive vice-president of Dravo Corp., Pittsburgh, Penn., has retired after 42 years of service. He will be succeeded by William E. Clark, vice-president and general manager of the engineering works division. A civil engineering graduate of Cornell University, Ithaca, N. Y., Mr. Dann served with the Corps of Engineers before joining Dravo Corp. in 1913. He was elected a vice-president and director when the present company was formed in 1930 and became executive vice-president. Mr.

Dann is a past-president of the National Sand and Gravel Association and a life member of the American Society of Civil Engineers.

Export Manager

EARL O. HEVERLY, formerly assisttant export manager, has been named export manager of National Gypsum Co., Buffalo, N. Y. He succeeds William R. Croscup, who has been appointed assistant to the general manager of the Canadian subsidiary, Wesco Waterpaints (Canada) Ltd., Montreal. Mr. Heverly was born in Pittsburgh, Penn., and graduated from Temple University, Phiadelphia, Penn. After several years with Warner Co., he joined the Bellefonte, Penn., lime plant of National Gypsum Co. in 1941. In 1948, he transferred to the industrial sales staff in Buffalo and five years later became assistant export manager in New York City. Mr. Croscup joined Wesco ten years ago, and remained with National Gypsum Co. when it purchased the Canadian subsidiary two and a half years ago. The export department has been transferred to Buffalo, N. Y., and will be under the direction of Amos B. Miner. general sales manager of the industrial division.

Chief Geologist

JOHN A. BROWN, chief geologist, has been placed in charge of the new geology department of Minnesota Mining and Manufacturing Co., St. Paul, Minn. The new department is part of the roofing granule division which has quarries at Wausau, Wis., Corona, Calif., and Little Rock, Ark. Mr. Brown received his B.A. degree in geology from the University of Minnesota, Minneapolis, Minn., in 1930 and has done graduate work at the University of Cincinnati and the University of New Hampshire, Durham, N. H. He joined the company in 1933 in the mineral laboratory. In 1935 he became geologist in the roofing granule division and in 1945 was appointed chief geologist.

Gilbert Olson Named F.O.A. Consultant

GILBERT E. OLSON, vice-president of Builders Supply Corp., Phoenix, Ariz., has been appointed consultant to the Foreign Operations Administration, Washington, D. C. Because of his background and experience, Mr. Olson was asked to serve as an adviser in the Office of Industrial Resources, F.O.A., which was recently transferred to the state department and renamed the International Cooperation Administration. Mr. Olson, who has traveled



Gilbert E. Olson

widely in Europe, has long been interested in progress of European housing and construction methods. He has been doing special work with Foreign Operations Administration.

Rockwood Honored Again

NATHAN C. ROCKWOOD, editorial consultant of ROCK PRODUCTS, was presented an Award of Merit at the recent meeting of American Society for Testing Materials for outstanding service to A.S.T.M., particularly in technical committee work. Editor and editor emeritus of ROCK PRODUCTS since 1917, Mr. Rockwood has been a member of A.S.T.M. since 1919 and a member of Committee C-7 on Lime since 1931, serving as chairman of the committee from 1940 to 1942. Currently, and for the past ten years, Mr. Rockwood has been chairman of Subcommittee VIII on Nomenclature, Definitions and Editorial: he is a member of Subcommittee X on Hydraulic Lime: past chairman of Subcommittee I, Advisory; and has been a member of Subcommittee II on Structural Lime, III on Lime for the Chemical Industries, and IX on Research. Mr. Rockwood also has been a member of Committee E-8 on Nomenclature and Definitions since 1945 and was a member of the former Committee E-5 on Standing Committees.

Mr. Rockwood is also a member of the American Institute of Mining and Metallurgical Engineers and the American Concrete Institute. He is an honorary member of the National Lime Association and an honorary director of the National Sand and Gravel Association and the National Ready Mixed Concrete Association.

Other A.S.T.M. members who received Awards of Merit are Robert C. Adams, Jr., superintendent, Chemical Engineering Laboratory, U. S. Naval Engineering Experiment Station, Ann-

apolis, Md.; Boris J. Barmack, senior engineer, Transmission Engineering Department, Commonwealth Edison Co., Chicago, Ill.; Edward Kilcawley, Head, Division of Soil Mechanics and Sanitary Engineering, Rensselaer Polytechnic Institute, Troy, N. Y.; Christopher E. Loos, assistant metallurgical engineer, Structural and Plate Bureau, U. S. Steel Corp., Pittsburgh, Penn.; Robert J. McKay, (retired) chemical engineer, International Nickel Co., New York, N. Y.; William T. Pearce, consultant on organic coatings, Bala Cynwyd, Penn.; Robert B. Sosman. visiting professor of ceramics, Rutgers University, New Brunswick, N. J.: George N. Thompson, assistant chief, Building Technology Division, National Bureau of Standards; William S. Young, section head, research division. Atlantic Refining Co.; and William A. Zinzow, assistant director of development, Bakelite Co., Bound Brook, N.

Marquette Superintendent

JAMES H. HAWKINS has been appointed superintendent and chief chemist at the Cowan, Tenn., plant of Marquette Cement Manufacturing Co., Chicago, Ill. Formerly general foreman and safety supervisor, he has been acting superintendent at the plant since 1954. Mr. Hawkins joined the laboratory at the Cowan plant in 1934 after attending Castle Heights Military Academy and Cumberland University, Lebanon, Tenn. He subsequently became plant analyst and then salesman for Cumberland Portland Cement Co., which is now a subsidiary of Marquette.

Chairman of the Board

RUSSELL S. RAREY has been elected chairman of the board of Marble Cliff Quarries Co., Columbus, Ohio, in addition to being president of the firm. He succeeds the late Harold J. Kaufman, who died June 5. R. C. Ninde was named a member of the executive committee, and John M. Altmaier succeeds Mr. Kaufman as a member of the board. Directors include Russell S. Rarey, R. C. Ninde, E. J. Kaufman, U. S. Kaufman, John S. Kaufman and Stephen Stepanian.

Division Sales Manager

WILLIAM W. KARL has been appointed division sales manager for Lehigh Materials Co., New York, N. Y., where he will be in charge of sales engineering for poured concrete work. A graduate of Duke University, Durham, N. C., with a B.S. degree in civil engineering, Mr. Karl took a special course of study with the Portland Cement Association on cement and con-

crete technology. For the past five years he has served as general manager of M. F. Hickey Co., Inc., Brooklyn, N. Y., ready-mixed concrete producer. Prior to that he was a technical service engineer for Universal Atlas Cement Co.

General Manager

EVERETT E. KNOTT has been named general manager of all plants of Texas Industries, Inc., Dallas, Texas, in north Texas and Oklahoma, according to an announcement by Ralph B. Rogers, III, president, in addition to his duties as general manager of the Texcrete Co. and Tex-Tile, Inc., Dallas. Plants included are Dallas Lightweight Aggregate Co., Dallas, Oklahoma Lightweight Aggregate Co., Oklahoma City, and Texas Lightweight Aggregate Co., Eastland. Before joining Texas Industries in 1941, Mr. Knott was with Lone Star Cement Corp. as assistant sales manager of the Texas division, and as sales manager of the Indiana division.

Re-elected President

A. L. WORTHEN was re-elected president of The New Haven Trap Rock Co., New Haven, Conn., and E. T. Perry, vice-president in charge of sales, at the recent meeting of the board of directors. R. J. Reigeluth was named chairman of the board; T. W. Jones, vice-president in charge of production; Robert S. Reigeluth, secretary and treasurer, and Lester E. Hintz, assistant treasurer.

Vice-President of Operations

PAUL A. Mort has been appointed vice-president in charge of operations of the Cleveland Quarry Co., Cleveland, Ohio. He joined the company in 1913 and has been superintendert of the Amherst quarry since 1940, which he will continue to supervise. He was elected a director of the company last March.

A.S.T.M. Director

DR. A. ALLEN BATES, vice-president for research and development, Portland Cement Association, Chicago, Ill., was appointed a member of the board of directors of the American Society for Testing Materials at the annual meeting held recently in Atlantic City, N. J.

Technical Director

G. EDWARD ELSENHANS, formerly technical service engineer for the Universal Atlas Cement Co., New York, N. Y., has joined the Metropolitan Sand and Gravel Corp., Port Wash-

ington, N. Y., as technical director. He replaces Elliott Harris, who has resigned to devote his entire time to other interests.

On C. of C. Board

JOHN H. McNatt, vice-president, secretary and general counsel, Missouri Portland Cement Co., St. Louis, Mo., has been elected to serve as a member of the board of directors of the St. Louis County Chamber of Commerce.

Director and President

PHILIP N. GROSS has been appointed a director and president of Gypsum, Lime and Alabastine, Canada, Ltd., Paris, Ontario, Canada, to succeed Percy P. Tyler, who has retired after 17 years of service, Mr. Tyler will continue as a director.

OBITUARIES

ALBERT CAMPBELL STEECE, former president and general manager of the Ironton Portland Cement Co., Ironton, Ohio, predecessor to Alpha Portland Cement Co., Easton, Penn., died June 20 after a long illness. He was 80 years old. Born and educated in Ironton, Ohio, Mr. Steece helped organize and direct the Ironton Portland Cement Co. which was built and went into operation in 1902, with Mr. Steece's father serving as president until 1918. Mr. Steece was general manager of the plant from 1903 to 1921 and was president of the firm from 1919 to 1920.

FREDERICK G. EBSARY, founder and president of the Ebsary Gypsum Co., Inc., Rochester, N. Y., died June 6 in his home in Scottsville after a long illness. A native of St. John's, Newfoundland, Mr. Ebsary moved to New York City as a young man and founded the gypsum firm there in 1911. Nine years later he took over a gypsum mine in Wheatland and later added a gypsum fabricating plant.

HAROLD J. KAUFMAN, chairman of the board of Marble Cliff Quarries Co. and Arrow Sand and Gravel Co., Columbus, Ohio, died June 5 at the age of 65. Mr. Kaufman was formerly president of these firms, serving until 1948 when Russell S. Rarey succeeded him and he became chairman of the board. He was also a member of the board of Arrowcrete Corp.

NEAL W. HELM, owner of the Caruthersville Sand and Gravel Co., Caruthersville, Mo., died June 4 while attending a meeting in Memphis, Tenn. He was 72 years old. Born in

Fort Worth, Texas, Mr. Helm moved to southeast Missouri in 1912 and became chairman and one of the organizers of the Tennessee-Missouri Bridge Commission. He was a close personal friend of former president Harry S. Truman.

GEORGE EDMUND HARDENBERGH, founder and president of the Stoneway Sand and Gravel Co., Seattle, Wash., died June 7 while attending a boxing event. Born in Lincoln, Neb., and raised in Tacoma, Wash., Mr. Hardenbergh worked in bridge construction in Idaho before becoming secretary of the Puget Sound Bridge and Dredgeing Co. He established the Stoneway Dock Co. in 1927. Three years ago he went into partnership with Lewis J. Dowell and changed the name of the firm to Stoneway Sand and Gravel Co.

ANDREW P. HACHTMANN, cement specialist and consulting engineer, who directed construction of many cement plants in the United States, South America and Central America, died June 13. He was 77 years old. A native of New York and a graduate of the Cooper Institute, Mr. Hachtmann joined the Atlas Portland Cement Co. in 1900.

WILLIAM EUGENE HORNE, president and director of the Limestone Products Corp. of America, Newton, N. J., died June 29 after a long illness. He was 82 years of age. One of the original backers of an agricultural limestone organization, Mr. Horne was a member of the National Agricultural Limestone Institute and had served on its Percentage Depletion Committee.

THOMAS J. NOLAN, president of the Concrete Plank Co., Jersey City, N. J., died May 27. He was 64 years of age. Mr. Nolan was also president of Thomas J. Nolan, Inc., contractors, and a director of the Commercial Trust Co. of Jersey City.

THOMAS J. STENCE, who for many years operated the Pleasant View Sand Co., Ashland, Ohio, died June 26 after a short illness. He was 68 years old.

HOWARD D. SMITH, president of the A. H. Smith & Son Sand and Gravel Co., Marietta, Ohio, died June 1 at the age of 57.

ROBERT J. ITTENBACH, retired vicepresident of the G. Ittenbach Stone Co., Indianapolis, Ind., died May 31. He was 58 years old and had retired two months ago.

NELSON E. MATHER, president and treasurer of Clinton Concrete Co., Inc., Clinton, Mass., passed away June 8. He was 88 years old.



Leading Manufacturers, also, of High-Speed Diamond Core Drilling Machines, "Oriented" Diamond Bits and a complete line of Improved Accessory Equipment for Core Drilling and Soil Sampling. Write for illustrated catalogues containing complete specifications and all necessary working data on:

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Orive Pisa Geogrings
Drive Shoese
Extensions, Core Sarrei
Fishing Tools
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INDUSTRY

NEWS

Cover Picture

THIS MONTH'S COVER ILLUSTRATION is an interior view of new mill built by Dragon Cement Co., at North-



ampton, Penn., for grinding raw materials (dry process) and clinker. This mill was designed for low-cost operation, maximum safety, and for ease in maintenance. Grinding cir-

cuits for the three large clinker mills in the background and for the two raw material units in the foreground are identical in arrangement. In both cases, materials are first proportioned by interlocked scales, crushed and delivered into overhead feed bins.

Each mill is fed proportioned, crushed material at an automatically controlled rate by a variable speed feeder which delivers material into a bucket elevator, transferring overhead by a screw conveyor into the mechanical air separator. Rejects are fed into the mill and the discharge from the mill, along with the fresh feed material, is delivered overhead by the single bucket elevator.

Large circulating loads are carried in all mill circuits. Heat is applied in the raw grinding air separators and cooling air is introduced through the clinker grinding air separators to cool the cement. Standard portland cement and high-early-strength portland cement may be ground separately.

Consolidated to Build Cement Plant

Consolidated Cement Corp., Chicago, Ill., has announced plans to build a new 1,250,000 bbl. cement plant at Paulding, Ohio, adjacent to its limestone quarry, which presently supplies limestone for the firm's Cement City, Mich., cement plant. The new plant is expected to be in operation in the fall of 1956.

Consolidated has already started a \$2,650,000 improvement and expansion program at its Fredonia, Kan., plant, which will increase the annual capacity from 1,000,000 to 2,300,000 bbl.

Recently the company listed its stock on the Midwest Stock Exchange.

The company's capital consists only of common stock, of which 275,000 shares are now outstanding and held by approximately 1800 stockholders. The common stock was recently changed from without par value to a par value of \$1 per share. Net sales for 1954 were \$6,275,703 and 1954 earnings after taxes were \$1,022,867, equivalent to \$3.72 per share.

Buys Duluth Slag Plant

WAYLITE Co., Chicago, Ill., has purchased the Duluth Slag Co., plant in West Duluth, Minn., appointed the Zenith Concrete Products Co., Duluth, manufacturing agent for Waylite products in the area, and has begun construction of a new expanded slag plant on the Interlake Iron Corp. property. The plant, expected to cost about \$500,000, will incorporate a Brosius machine for expanding the slag — a different method from that used by the Duluth Slag Co. This machine applies steam, air, and water in the process.

Zenith is currently building a new concrete products (including pipe) plant adjacent to the Interlake property. This will be the first concrete pipe plant in Duluth.

Stone Plant Goes Underground

COLUMBIA CEMENT DIVISION, Pittsburgh Plate Glass Co., is converting to a complete underground (sidehill) limestone mining and stone processing operation at its East Fultonham, Ohio, cement plant. Under the new set-up, which is to be completed within two years, the stone will be crushed and sized in the mine close to the working faces, and carried by a 1000-ft. belt conveyor to the mine entrance, followed by a 700-ft. conveyor across Jonathan Creek to the storage bins of the raw grinding department. Annual production will be 600,000 tons.

While the new facilities are being built, the old stone plant, located adjacent to the cement plant, will continue to operate. The conversion was necessitated by the depletion of suitable limestone from the company's quarry. Attempts to purchase additional limestone acreage were unsuccessful. The present mining operation was started in 1950, and since that time, the mine and quarry each supplied about half of the cement plant requirements. Unique features of the mine include a modern rest room and sanitation facilities, lunch room, and maintenance shop.

Opens Supply Yard

STRAITS AGGREGATE AND EQUIP-MENT Co., East Tawas, Mich., has opened a new office and supply yard in Bay City, Mich., as a part of its expansion program in northeastern Michigan. The company will stockpile crushed stone and sand, brought in from pits near Rogers City, where the company produces about 500,000 tons of stone and sand annually. Richard Jarvis is superintendent of the new yard.



Plant facilities are shown here of Dravo Corp., Keystone Division's new unit in the Ohlo Valley at Rochester, Penn., for the distribution of building supplies and materials.

The plant is immediately adjacent to main river, road and rail traffic lines

Mexican Cement Plant Proposed

NATIONAL CHAMBER OF THE MEXI-CAN CEMENT INDUSTRY has recommended the establishment of a cement plant with a 500-ton daily capacity in the state of Baja California. According to Federico Sanchez Fogarty, manager of the Chamber, the proposed plant, costing \$7,200,000, could eliminate imports from the United States and provide sufficient surplus for export to southern California. However, Mr. Fogarty warned that operation of the plant would be feasible only if the state's economic status as a tariff-free import zone is maintained.

Current daily cement consumption in Baja California is 200 tons, about 80 percent of which is being imported from the U. S. at \$32-40 per ton. The new plant, if constructed, could provide cement at about half this price, according to Mr. Fogarty.

To Build Feldspar Mica Plants

SPAR-MICA CORPORATION, LTD., Montreal, Que., a joint undertaking of Electro Refractories and Abrasives Corp., Buffalo, N. Y., and Strategic Materials Corp., Montreal, is planning to build a new feldspar mining and processing plant near Johan Beetz, Que., (east of Havre St. Pierre on the St. Lawrence River) and a new ground and sheet mica plant near Tadoussac, Que. Both deposits, consisting of mineral-rich pegmatite dikes, are at tidewater, which will permit bulk boat shipments to eastern U.S. and Great Lakes ports at less than half the cost of rail transport.

The feldspar plant, expected to be in operation by October, will have a capacity of 300 tons of feldspar concentrate per day; it will feature a new and unique processing method developed by Grant S. Diamond, Spar-Mica president, which is believed to yield 50 percent more glass spar concentrate than present upgrading methods.

Builds Gypsum Plant

NATIONAL GYPSUM Co., Buffalo, N. Y., has announced plans to build a gypsum wallboard and plaster plant in Burlington County, N. J., which is expected to be in production by mid-1956. It will be the company's 38th plant, and is being built as part of a recently announced five-year \$75,000,000 expansion program. It will be located on the Delaware River to facilitate shipment of raw materials from gypsum deposits near Halifax, Nova Scotia, Can., via 15,000-ton cargo ships currently being built in Germany.

The company also plans to build plants in Anniston, Ala., and New

Orleans, La., and is currently building a plant at Shoals, Ind. The Anniston plant will manufacture wallboard cover paper, at a capacity of 200 tons of paper daily.

Two Cement Plants Planned For Ontario

Two NEW CEMENT PLANTS are being planned for the Beachville district of southwestern Ontario. Canada Cement Co. has already begun construction of a \$12,000,000 wet process plant near Woodstock, which is expected to be in operation in 1956. It will have an annual capacity of 1,500,000 bbl. and employ 150 to 200. Machinery and equipment will be supplied by Canadian firms.

Associated Portland Cement Manufacturers Group, London, England, is planning a \$20,000,000 plant near Ingersoll. Options on 1300 acres of farmland have been taken, and exploratory drilling is now in progress. The plant will have an annual capacity of 2,000,000 bbl. and employ about 350. Decisions on actual plant location and equipment have not yet been made.

\$350,000 Office Building

AMERICAN AGGREGATES CORP., Greenville, Ohio, is constructing a \$350,000 building in Greenville to house its home office. To be finished by mid-1956, the building will provide 19 private offices, a board of directors conference room, facilities for accounting and engineering departments, a combination lunch and recreational room, and a reference library.

American Aggregates is also planning to build a new sand and gravel plant on a 150-acre site in Moraine Township near Dayton, Ohio.

Start Gravel Plant

SYDNEY SAND AND GRAVEL Co., Sydney, Ohio, has opened up a new 150 t.p.h. sand and gravel plant along Van Demark Road in Shelby County. The plant, designed and erected by the Lippman Engineering Co., is operated by the William Milligan family. Major plant equipment includes a primary and a secondary crusher, several washing screens and storage bins, and a radial stacker used for sand. The Sydney deposit contains boulders up to a foot in diameter.

Calaveras Expansion

CALAVERAS CEMENT Co.'s board of directors recently approved an expansion program costing \$4,000,000, which will add a fifth rotary kiln, 11 ft. 3 in. by 360 ft., to its plant at San Andreas, Calif. The additional kiln will increase the plant's capacity by an additional 30 percent, boosting

the company's productive capacity to approximately 4,500,000 bbl. annually. Also included in the expansion program is auxiliary equipment; such as coolers, dust collector, Multiclone, thickener, and raw and finish mills.

The previously approved 1955 plant improvement program includes the building of four cement storage silos, and quarry, plant and shipping department improvements, which have already been completed.

Buys Trap Rock Plant

NEW YORK TRAP ROCK CORP. has exercised an option to purchase the land, plants and equipment of the West Nyack Trap Rock Company, West Nyack, N.Y. The purchase price will be in excess of \$1 million. The date for closing of title will be no later than December 15, 1955.

Acquisition of the West Nyack plant and property from Walter and Herbert Dahm, the present owners, will replenish the 28,000,000 cu. yd. of stone which the company has quarried at its present plants since the war. The West Nyack property comprises over 150 acres of land, 120 of which are stone bearing and contain an estimated 25,000,000 cu. yd. of trap rock. The plant has an annual capacity of 500,000 tons. There are, in addition, plants for processing bituminous and concrete materials.

\$2,500,000 Fire

KAISER GYPSUM Co.'s wallboard plant at Redwood City, Calif., was destroyed on June 24, by a spectacular fire, causing an estimated damage of \$2,500,000. No plant personnel were injured. Flames of undetermined origin broke out in a roof of a frame building and spread throughout the plant. Numerous small manufacturing units, several warehouses, and two freight cars were destroyed. The plant had an annual capacity of 94,000,000 sq. ft. of gypsum board, and also produced texture paints and joint cement. It employed 130 persons.

Wisconsin Quarry Sold

Consumers Co., Chicago, Ill., a division of Union Chemicals and Materials Corp., has acquired the limestone quarry and other properties of the Lutz Co., Oshkosh, Wis. The purchase is part of a gradual company expansion program to meet the rising demand for construction materials. No change of personnel is contemplated.

Chicago Quarry Firm Sales

Dolese and Shepard Co., Chicago, Ill., a crushed stone producer, had net sales in 1954 almost identical to 1953, totalling \$2,058,685. Cash dividends amounted to \$226,100 or \$9.50 per share.

Further Lone Star Cement Expansion

LONE STAR CEMENT CORP., New York, N. Y., has announced plans for enlarging its cement plants at Lone Star, Va., (near Roanoke), at Spocari, Ala., and further enlargements at Nazareth, Penn., to provide a total increase of 2,200,000 bbl. of cement annually. These plans are in addition to the previously announced modernization of plants at Greencastle, Ind., Bonner Springs, Kan., and Nazareth, Penn. Cost of the current and enlarged expansion program totals approximately \$22,700,000, which will increase annual capacity to a total of 37,860,000 bbl. for the company's 18 cement plants.

At Lone Star, Va., the program calls for addition of a fourth kiln and cooler, dust collectors, silos, raw and finished grinding installations, shale crushing plant, electrical and power facilities, as well as incidental structures and extensive alterations. It is the second time the plant has been enlarged since its completion in 1951, and will increase its capacity by 800,-000 bbl. to a total of 3,200,000 bbl. of cement annually.

At Nazareth, Penn., plans provide for a fourth kiln and cooler with building expansions, electrical precipitator unit, coal mill equipment and finish mill machinery. This will further increase capacity there by 900,-000 bbl. to a total of 3,600,000 bbl.

At Spocari, Ala., the program calls for a 50 percent increase in production by the addition of a third kiln and cooler, dryer, raw and finish grinding facilities, and related installations and structures. The increased output will be shipped in clinker form to the company's New Orleans, La., plant where it will be converted into finished cement, increasing the finished cement capacity of the New Orleans plant by 800,000 bbl. to a total of 3,000,000 bbl. annually.

Since the end of World War II, the company will have increased its productive capacity by 51.5 percent, or a total of 12,860,000 bbl. annually.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 27,847,000 bbl. of finished cement in April, 1955, as reported by the Bureau of Mines. This was an increase of 14 percent over the April, 1954, figure. Mill shipments totaled 24,993,000 bbl., 6 percent more than in April, 1954, while stocks were 4 percent less than on the same date a year ago. Clinker production during April, 1955, totaled 24,471,000 bbl., an increase of 13 percent from the April, 1954, figure. The output of finished cement during April, 1955, came from 157 plants in 37 states and Puerto Rico. During the same period of 1954, 21,730,000 bbl. of finished cement were produced.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of June were listed by the Portland Cement Association as

Sq. yd. awarded during June, 1955 3,966,080 4,376,156 950,211 Total 9,292,447

Gravel Company Sold

FRITZ NABER, owner and operator of the Havre Sand and Gravel Co., Havre, Mont., has sold his business to the Baltrusch Construction Co. The plant will be operated under the same company name.

Second St. Lawrence Cement Plant to Be Built

St. LAWRENCE CEMENT Co., Villeneuve, Quebec, announced plans to build a cement plant at Clarkson, near Toronto, Ontario. The company also has a cement plant in Villeneuve, near Quebec City, which went into operation in January, 1955. The new plant will be similar to the Quebec plant, and will have an annual capacity of about 1,500,000 bbl. or 6,000,000 bags of cement. Total cost has been estimated at \$15,000,000, which will be financed entirely by Swiss industrialists. The project is being worked out by the engineering staff of the company, and most of the mechanical and electrical equipment will be ordered in Canada. Local contractors will handle construction of the plant which is expected to be in full scale operation by April, 1957.

Coming Conventions

August 8-10, 1955-National Cinder Concrete Products Association, Summer Meeting, Hotel Chalfonte - Haddon Hall, Atlantic City, N. J.

September 19-24, 1955-National Industrial Sand Association, Fall Meeting, The Greenbrier, White Sulphur Springs, W. Va.

October 10-13, 1955-American Mining Congress, Annual Convention, Las Vegas, Nev.

October 17-21, 1955-National Safety Council, 43rd Congress and Exposition, Conrad Hilton, Congress, Morrison and La Salle Hotels, Chicago, III.

October 20-21, 1955-Empire State Sand, Gravel and Ready Mix Association, Fall Meeting, Hotel U. S. Thayer, West Point, N. Y.

November 14-16, 1955-**American Concrete Pipe** Association, Fifth Annual Short Course School of Instruction, Chase Hotel, St. Louis, Mo.

January 23-25, 1956-National Concrete Masonry Association, 36th Annual Convention, Roosevelt Hotel, New Orleans, La.

February 13-16, 1956-National Sand and Gravel Association, 40th Annual Convention and Biennial Show, Conrad Hilton Hotel and Chicago Coliseum, Chicago, III.

February 13-16, 1956-National Ready Mixed Concrete Association, 26th Annual Convention and Biennial Show, Conrad Hilton Hotel and Chicago Coliseum, Chicago, III.

February 20-22, 1956-**National Crushed Stone** Association, 39th Annual Convention and Exposition, Conrad Hilton Hotel, Chicago, III.

HINTS

AND HELPS PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Improve Aerial Tramway **Bucket Fastening**

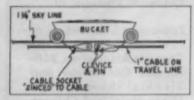
AT A WESTERN GYPSUM MINING OPERATION, a 3670-ft. long aerial tramway delivers crushed material from mine to rail head. There are 54 buck-



Buckets on cerial tramway carrying crushed gypsum. Traveling line is fasten-ed to bottom of buckets with special socket and clevis to remove strain in going over loading and unloading terminals

ets on the line, each holding 0.87 ton. The traveling line cable is 1-in. dia. and moves at 370 f.p.m. The longest span is 445 ft., and the difference in elevation between terminals is 900 ft. Two track line cables for the loads are 11/2-in., and the track line cables for the empty return buckets are 1 in. and % in.

Formerly, the traveling line was fastened rigidly to the bottom of each bucket. Under this old arrangement,



Details of clevis and pin fastening on bucket to remove strain from traveling cable of aerial tramway

when the bucket rode over the loading and unloading terminals, a strain would be put on the line at the points of connection to the bucket. This strain in time was sufficient to cause line failures.

To overcome this condition, the company now connects the traveling line to each bucket by means of two

swivelled sockets, as shown in the illustration. The other end of the socket is fastened to the bucket by a pin and clevis so that when the bucket goes over the terminals there is some "give" to the assembly. It is expected that this method of fastening buckets to the traveling line cable will materially increase the life of the line.

Bucket Elevators In Series

CONCRETE BLOCK PLANTS in highly competitive areas must do the job with a minimum of equipment. At one plant in the northwest volcanic cinders are crushed in a set of rolls. A short

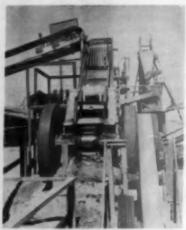


Small bucket elevator delivers to a stationary screen to discard oversize from roll crusher. Longer conveyor carries screened, crushed product to bins

bucket elevator picks up the crushed cinders, and dumps them over a temporary stationary screen. The small amount of plus material is discarded. Throughs flow to a longer bucket elevator, serving the bins over the plant. Adequate space has been left between the two elevators to later install a vibrating screen.

Vibrating Grizzly

VERY OFTEN A GRIZZLY is installed ahead of a crusher with the grizzly vibrated or shaken by ticing the assembly into the mechanism of the crusher. The illustration shows a griz-



Grissly tied in with jaw crusher toggle mechanism to give it movement

zly installed as part of an Acme Roach Machinery Co. jaw crusher assembly. The crusher in this case was used as a secondary unit in the reduction of pumice. This grizzly was made with relatively light round steel bars. An arm extended from the grizzly to the toggle mechanism of the crusher (cam-like rollers) to give the grizzly some motion.

Tramway-Stockpiling System

AT A WESTERN GYPSUM PLANT near Las Vegas, Nev., an aerial tramway delivers crushed material from the quarry to the plant. Loaded buckets ride two parallel track cables. An endless travelling line connects bucket to bucket. To unload, the buckets are simply passed over a large diameter tumbler wheel at the lower terminal.

In the illustration, the buckets are shown as they are about to be unload-

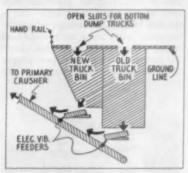


from primary crusher in the quarry to stockpiling bin

ed in the structure over the parabolic bins. Cars can be loaded direct from this bin. Excess material can be sent to the ground storage pile, to the left, under which a reclaiming belt conveyor operates. Material may also be sent direct to the processing plant by other belt conveyors, to the right. All material is crushed at the upper terminal to about minus 1½-in. before transporting it by tramway buckets.

Speed Up Truck Haulage

ONE OF THE IMPORTANT west coast sand and gravel plants uses Euclid bottom-dump trucks to haul material from pit to plant. At one time there



Dual bin arrangement which speeds up truck unloading

was one truck hopper serving the plant which became the bottle-neck of the operation because it was too small and trucks often had to wait to unload. A



Showing one of the two bins feeding belt

second bin was therefore built immediately in front of the older bin. Syntron electric vibrating feeders facilitate movement of material to a belt conveyor serving the plant's primary operation. The sketch shows the bin arrangement.

Crusher Drive

AT THE NEW HAVEN TRAP ROCK. Co., Plainville, Conn., plant a 250 t.p.h. secondary cone crusher has been operating 8 to 10 hr. per day equipped with a Poly-V, Raybeatos-Manhattan





Cone crusher drive uses belt with Vshaped rubber ribs molded lengthwise around the inside of a common backing

drive. The crusher belt is 331 in. long (P.L.) and 12¾-in. wide; sheaves are 27 in. pitch diameter. A 300 hp., 540 r.p.m. motor drives the crusher.

The belt design consists of a series of v-shaped rubber ribs molded lengthwise around the inside of a common backing. This design is said to solve the crusher's belt matching problem and permits the use of narrower and smaller diameter sheaves on the drive. The belt ribs are unable to sink further into the sheave grooves when the crusher transmits a sudden load back to the drive. Longer wear is partly responsible due to the fact that the face pressure is cut in half and the thinness of the belt allows greater area to be exposed to the air for cooling.

To trim a wide belt in the field to fit a narrower sheave, the belt can also be cut lengthwise along the grooves with a sharp knife.

Dustless Truck Loading

PORTLAND CEMENT must be handled in a dustless manner in most metropolitan areas. In the illustration may be seen air-activated containers of the L.C.L. Corporation unloading from a railroad car in Brooklyn, N. Y., direct to a cement haulage trailer. It will be noted that the cement haulage unit has a bag filter on the vent of the truck so that no dust escapes to the atmosphere. These air-activated containers



Beg filter on vent of truck prevents escape of dust

will handle most any finely divided material.

Railroads licensed to use the containers haul bulk materials in them without added cost to the shipper as they are considered standard railroad equipment. In this particular case, the bulk cement was allowed to be unloaded in a confined area, permitting the consumer to take delivery at a point where a low freight rate applied with obvious savings.

Kiln Feeder

A SYSTEM OF FEEDING A ROTARY KILN producing lightweight aggregate has been developed by one producer in which all the operation functions are tied in with each other. A change in the speed of the kiln automatically cuts down or increases the flow of material to the kilns. A simple belt feeder delivers the raw material from the storage silos to a bucket elevator serving the kiln.



Lower belt conveyor is the shale feeder to bucket elevator. Feeder and elevator are synchronized with speed of kiln

NEW

MACHINERY



Self-Propelled Drill Carrier

GARDNER-DENVER Co., Quincy, III., has announced the Air Trac (R) selfpropelled drill carrier with crawlertype tracks. It consists of a hydraulically actuated T-bar mounted on two self-propelled crawler treads each powered by an air motor. Traction power developed is said to be sufficient to haul an 11,720-lb. compressor up a 10 percent grade. The T-bar controlling height of the chain feed is positioned by a hydraulic hand pump that actuates two lift cylinders. Once the T-bar is positioned and the hydraulic mechanism is locked, the T-bar position is claimed to be self-equalizing and load distribution on the two crawler tracks is said to be self-stabilizing. The T-bar swings through a vertical arc of 861/2 deg., for accurate line-up for vertical, angle, or toe hold positions.



Two Bolt Flange Bearing

STEPHENS-ADAMSON MANUFACTURING Co., Sealmaster Div., Aurora, Ill., has brought out a two-bolt flange, ball bearing unit, interchangeable with Sealmaster four-bolt flange units on the diagonal bolt hole dimension. The bearing is available in shaft size from

½ to $2\frac{1}{16}$ in., and has such patented design features as zone hardening, self alignment with locking pin and dimple and labyrinth seal. On new installations the bearing eliminates two fasteners, as well as punching or drilling operations for two mounting holes. It also permits closer bearing spacing on multiple shaft installations. As a replacement bearing, it fits the diagonal bolt centers on present four-bolt base flange units and carries the same load rating for a given shaft size.



Electric Vibrator

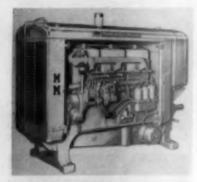
THE CLEVELAND VIBRATOR Co., 2828 Clinton Ave., Cleveland, Ohio, has introduced the RC-30-LSRR electric vibrator which utilizes the rotary weight shaft principle of developing vibration, but is self-contained with no pulleys or belting. A totally enclosed housing seals the unit from moisture and dust. The unit is furnished completely equipped, ready to install, and includes a 10-ft. cord, water-tight disconnect plug with a heavy-duty combination circuit breaker and manually operated switch. It is available in a choice of voltages from 110 to 550. It may be installed for use on bins, hoppers, chutes, etc., by means of a female bracket of the same type used on covered hopper railroad cars.

Semi-Automatic Welder

AMERICAN BRAKE SHOE Co., Amsco Div., New York, N. Y., is field testing the MF welder, a semi-automatic welding machine, which feeds bare wire through a hand-held hopper containing magnetic flux. The flux clings to the wire as it leaves the hopper, due to the magnetic field set up by welding current flowing through the wire. Thus the electrode wire, which is fed continuously from a coil, reaches the arc

with a flux covering, contributing the advantages of a manual electrode coating. The operator is said to be able to weld steadily for 15 min. if desired; the delay of replacing electrodes and the waste of stub ends are eliminated.

The unit may be connected to a conventional a-c or d-c welding machine, and operate over a current range of from 150 to 500 amps. It consists basically of a hook-up cable, a small chassis mounting an electrode wire reel, motor-driven feed rolls, and a flexible 14-ft. tube through which the electrode wire feeds to a hand-held hopper. The portable model has wheels for easy movement, and is pear-shaped for ease in pulling it around on the job.



Diesel Power Unit

MINNEAPOLIS-MOLINE Co., Box 1050, Minneapolis 1, Minn., has announced the D605-6A, 105-hp. diesel power unit with a "thermoclad" waterjacketed base pan. The unit is of heavyduty industrial design with six cylinders, and has a 45%-in. bore and 6-in. stroke. Piston displacement is 605 cu. in. Uniform operating temperature from cylinder heads to the bottom of the base pan is maintained by the coolant-jacketed base pan, through which coolant circulates continuously, Two oil filters are enclosed in the base pan, with covers on each side for accessibility. The cylinder heads are cast in pairs, and have special coolant nozzles for each combustion chamber to direct the coolant to the hottest parts of the heads. The combustion chambers are designed for progressive burning of diesel fuel to give sustained power strokes.

A multiple-plunger Bosch injection pump is said to provide quick response and accurately meter the fuel for heavy load demands. The governor is enclosed in a dust-proof housing, integral with the pump, and a specially-designed torque plate is incorporated for proper torque build-up to handle lugging loads. Self-cleaning, pintle-type fuel nozzles are installed with "o-ring" seals for protection against oil leakage, and to facilitate removal in servicing. The three-stage fuel filter is gravity-fed through the primary and secondary stages. A by-pass between the secondary and final stages is said to prevent dirt or other abrasive material from being forced into the close-fitting injection parts.

Optional equipment includes attachments for cold-weather starting; fuel cut-off to stop the engine in case of insufficient oil pressure or excessive water temperature; and an oil level controller. Sight oil glass is standard

equipment.



Turbocharged Diesel

CUMMINS ENGINE Co., INC., Columbus, Ind., has announced a lightweight, 175-hp. Turbodiesel, designated the JT-6. It is a six cylinder, in-line type with a 41/a-in. bore, 5-in. stroke and displacement of 401 cu. in. Installed in a truck, it weighs 1615 lb., or 9.2 lb. per hp. It utilizes the normally wasted energy of the exhaust gas to create added power, accomplished by piping the exhaust through a turbine which is one element of the turbocharger. Expansion directs the exhaust gas against the turbine blades, causing the wheel to rotate at high speed. A centrifugal impeller, mounted on the same shaft, but in a separate housing, draws fresh air and blows it into the intake manifold and cylinders under pressure. More weight of fresh air is forced into the cylinders and a greater quantity of fuel can be

burned completely, creating more power at the flywheel.

The turbocharger is usually mounted above the exhaust manifold on the right hand side of the engine. However, mountings for other locations at the rear and side of the engine are available. Air is piped across the top of the engine to the intake manifold.



Horizontal Vibrating Screen

LINK-BELT Co., 307 Michigan Ave., Chicago 1, Ill., has added a horizontal vibrating screen, known as the "Straightline," to its line of screening equipment. It is especially suited for dewatering high capacity loads and sizing of materials where headroom is limited. The screen has two vibrators, one mounted on each side of the screen at deck level for ease of inspection. Both are located at the center of gravity, to assure uniform vibration, and the vibrators do not project above the sideplates so that headroom is held to a minimum. The screens are available in sizes from 4 x 8 ft. to 6 x 20 ft., with either one or two decks.



Semi-Automatic Alloy Wires

STOODY Co., Whittier, Calif., has introduced a line of tubular fabricated alloy wires for open arc application through standard semi-automatic welders. The process requires no flux and deposits 7 to 15 lb. of hard metal per hr. The $\frac{\pi}{4}$ -in. alloy wires are available in three types: a 50 percent high chromium hard-facing alloy; a 20 per-

cent alloy for hard facing; and a Hadfield nickle manganese for build-up of manganese steel parts. The wires are said to be approximately 90 percent efficient, since they are bare, and also have no slag removal problem.

In operation, semi-automatic welding, using the tubular wires, is similar to manual welding, but the wire feed is continuous, and both the feed and arc control are automatic. Application by open arc provides visibility while operating. Almost any standard semiautomatic welder, with minor adaptations, can be used for the process. A welding nozzle, special grooved feed rolls and supplementary wire guides are all that are required to make the conversion in most cases. Current required for the semi-automatic wires does not exceed 350 amp, and a power source of not less than 400 amp. is recommended.



Tractor Design Changes

CATERPILLAR TRACTOR Co., Peoria 8, Ill., has announced some major design changes for the DW15 (Series C) tractor. These include a 186-hp., 51/6-x 61/2-in. engine and a transmission case designed to provide positive lubrication under adverse operating conditions. The tractor is now equipped with the No. 27 cable control for positive scraper response and increased cable control clutch and brake life. The "Cable Saver" has been made standard equipment with No. 15 scrapers.

Gyratory Ball Mill

GENERAL MACHINERY Co. of Spokane, Wash., is marketing a gyratory ball mill, developed by A. W. Fahrenwald of Moscow, Idaho. The media container is cylindrical in form, and the mill axis is vertical. The mechanism of the mill is engineered to gyrate the mill in a circle and hold it from rotating about its axis. This is effected by means of a coil spring, or a group of coil springs, one end of which is fastened to radial arms of the pedestal on which the mill rests, the other end to the main frame. It is directly driven by a vertical ball-bearing motor, Vbelts and pulleys, climinating the need for gears. The grinding principle is said to enable grinding four times as fast as conventional ball mills, and the balls

are said to be in action under centrifugal force 100 percent of the time. The mill operates open or closed to atmosphere, wet or dry, and as a batch or continuous mill. It is available with steel, rubber-lined steel or porcelain bowls.



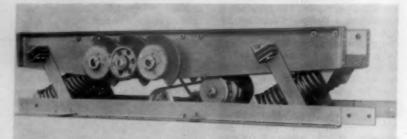
Suspended Vibrating Screen

SYNTRON Co., 450 Lexington Ave., Homer City, Penn., has introduced the Syntron-Sinex vibrating screen, available in single or double deck models, in open or totally enclosed, pressure tight, waterproof, permanently lubricated electric motor with unbalanced weights on the shaft. The screen may be furnished with woven wire panels of from No. 50 to ¾-in. openings, of the hook strip type for easy replacement. Four way tensioning, with each longitudinal and transverse wire carrying a full load, increases the screen life.



Motor Scraper

GENERAL MOTORS CORP., Euclid Div., Cleveland 17, Ohio, has added Model S-7 to its line of motor scrapers, providing a scraper line with 7-, 12-, 15.5- and 18-cu. yd. struck capacities. The S-7 is an overhung engine scraper, powered by a 143-hp. diesel engine with a five-speed transmission. Scraper operations, bowl, apron and ejector, are hydraulic lever-controlled. permitting independent control and eliminating down time resulting from cable breakage. The unit has one 11ft. section of cable for the apron. A four section cutting edge, with each section identical, adjustable and reversible, provides blade arrangements for various types of material, and is designed for longer blade life.



Vibrating Trough Conveyor

GIFFORD-WOOD Co., Hudson, N. Y., has announced the "Oscilveyor," a vibrating trough conveyor for handling bulk materials. It consists basically of a drive unit, a trough resting on rocker arms and coiled springs, and a supporting base frame. It is driven by rotating eccentric weights, geared and synchronized to move in such a way that centrifugal forces reach a maximum at points 180 deg. apart in the circle of travel. To assure silent operation, two of the three gears are made of fiber, the other being of cast iron, meshed to the other two fiber units.

The coil springs and rocker arms are mounted on rubber pads for longer life. The base frame and saddle are of standard construction, and the troughs are available from 8 to 24 in. wide. The troughs may be made of mild steel, stainless steel, clad steel, aluminum, etc., and open type, weatherproof, or dust-tight construction may be specified.



Sonic Analyzer

KINETIC INSTRUMENT Co., 3250 Skokie Valley Rd., Highland Park, Ill., has brought out the "E-Scope," a sonic analyzer for non-destructive testing of solid and visco-elastic materials, including glass, wood, metals, plastics, tile, brick, carbon, graphite, ceramics, adhesives, rubber, and abrasive wheels. It meets A.S.T.M. specifications for testing concrete. The analyzer features accuracy, portability

and provides measurement of effects of natural or induced deterioration, flaws or inclusions, or product uniformity. It is a self-contained instrument designed for laboratory use, field testing or production quality control.



Twin-Unit Package Boiler

UNITED STATES RADIATOR CORP., Cyclotherm Div., Oswego 2, N. Y., has developed the C-5000 twin-unit package boiler, which delivers 10,000 lb. per hr., and is available at operating pressures up to 200 p.s.i. The units are equipped with variable capacity burner nozzles, and burn oil, gas, or a combination of the two. Furnished with modulating equipment, the unit can produce steam at one-third rated capacity, thus enabling it to handle fluctuating loads from 1300 lb. per hr. to the full 10,000 lb. maximum with no lag in steam production throughout the cycling range. The twin boiler installation utilizes 104 sq. ft. of floor area, each unit being 8 ft. long by 5 ft. 1 in. wide by 7 ft. high. In twin unit installation a 2 ft. 10 in. aisle is left between the boilers for servicing.

Torque Coupling

THE TECHNIFLEX CORP., Port Jervis, N. Y., has brought out a torque-limiting coupling for controlling and fixing the maximum torque transmitted from a driver to a driven machine. Up to the limit to which it is adjusted the torque coupling acts as a conventional coupling. Beyond this adjusted limit, it permits a free wheeling or slip effect between the driving and driven halves of the coupling. Functional features claimed are: the ability to use the de-coupling action in tripping a safety or emergency switch; the ability

to apply the repetitive detent action in which the slip effect is based towards a repetitive "hammer-blow" effect; and its ability to work as a bidirectional torque coupling with independent torque ratings for each direction, if required. Couplings are available in standard nominal rating from 24 in.-lb. to 100,000 in.-lb. All couplings are adjustable from 50 to 150 percent of the nominal ratings.



Wheel Tractors

THE OLIVER CORP., 400 W. Madison St., Chicago 6, Ill., has introduced Models Super 77 and Super 88, industrial wheel tractors available with either gasoline or diesel engine. The frames are reinforced and have special mounting pads to provide an attachment point for a variety of tractormounted equipment. The transmissions have six forward speeds and two reverse. Other features include: double-disc differential brakes; bypass cooling; removable wet cylinder sleeves; engine hour meter; auto-type recirculating ball steering; and a torsional rubber suspension seat that adjusts by a hand screw to suit the weight of the operator. Optional equipment includes an independently controlled rear power take-off.

Bulk Cement Transporter

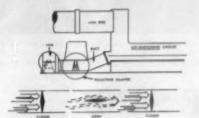
FRUEHAUF TRAILER Co., Detroit, Mich., has introduced a bulk cement transporter which incorporates the "Airslide" method of unloading and rigid, lightweight Aerovan structure. The unit has a 100- to 120-bbl. capacity and, in the single panel form, it is housed within an Aerovan structure. The 24-cu. ft. container can be located backward or forward within the framework for effective load distribution.

The "Airslide" principle, a development licensed to Fruehauf by Fuller Co., Catasauqua, Penn., forces air through a specially woven fabric to agitate the load and break through its normal angle of repose. It is said to unload 120 bbl. of bulk cement in less than 7 min. The unloading device is powered by a 10-hp. air cooled engine located in a weatherproof compartment in the nose of the vehicle. The engine is equipped with a self-



starter, high-speed blower and an air filter.

A twin-panel transporter is also available with the same basic principles as the single panel but in shorter length, permitting it to be built as either a semi-trailer or as a full trailer.



Pulsating Damper

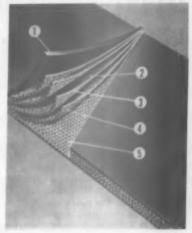
ALLIS-CHALMERS MANUFACTURING Co., Milwaukee 1, Wis., has developed a pulsating damper designed to provide better fuel economy and steadier kiln operation for its air-quenching cooler. Installed in the air duct between the cooler fan and the body of the cooler, the rotating damper vane creates a pulsating flow of air from the cooler into the kiln. The pulsing action moves the hot secondary air into the kiln uniformly, heat loss is said to be reduced, and combustion is stabilized. The damper is powered by a small d.c. motor and gear reducer mounted outside the duct work. The damper vane is of welded construction and fitted to a shaft which revolves in antifriction bearings.



Roller Bearing Roll Crusher

IOWA MANUFACTURING Co., Cedar Rapids, Iowa, has announced a 55-x 30-in. roller bearing roll crusher, Model 5530, for secondary crushing operations. Capacities range up to 520 t.p.h., depending upon the size of finished product desired and mate-

rial characteristics. Maximum finished size is 5 in., and minimum is ½ in. Finger timing gears of chrome molybdenum steel transmit the power from the stationary to floating roll. The crusher can be equipped with two smooth roll shells, two corrugated shells, on one of each, depending upon operating requirements. Safety shear plates are incorporated to protect the crusher against tramp iron or uncrushable material. The opening between the rolls can be adjusted by inserting or removing shims in a slot on top of the frame.



High Tension Conveyor Belts

Boston Woven Hose and Rubber Co., has introduced two high tension conveyor belts, constructed of synthetic fabrics, the "Boston High Load," and "Boston Haul King." Designed for heavy duty use on long center and high lift installations, the belts have working tension ratings up to 110 lb. per in. per ply. The "High Load" is designed for extra heavy service, and the "Haul King," for general heavy duty in high tension, high stress applications. Both types are available with fabrics of all rayon or chemically treated cotton warp with nylon filler.

Features illustrated above are: (1) high strength permits fewer number of plies; (2) high strength to bulk ratio; (3) mildew-resistance; (4) skim coating to prevent fatigue failure from flexing; and (5) high transverse and longitudinal strength provides thin, lightweight construction.





Left: Sand recevery section of plant: (A) pump which picks up finished fine sand from liquid cyclones; (B) a 48-in. spiral dewaters sand from water scalper (C); (D) fines from cyclones can go by chute direct to sand off-bearing belt, if desired. Right: Water scalper or has an area of 8- x 20-ft. Overflow from scalper and overflow from 48-in. spiral is pumped to four liquid cyclones

Recover FINE SAND With "Water Scalper" and Cyclones

By WALTER B. LENHART

VARIOUS TYPES OF BITUMINOUS PAV-ING MATERIALS are produced by the Sully-Miller Contracting Co., Orange, Calif. These materials are sold to other contractors, but some of it is used for its own jobs. Aggregates for this work are prepared at the Orange plant which was formerly operated by Graham Bros. While most of the plant is not new, it is now undergoing modernization, including the installation Sully-Miller Contracting Co., Orange, Calif., meets "sand equivalent test" requirements by removing clay from fine sand used for bituminous mixes

of stacker belts from the plant to the storage piles. Trucks built up the storage piles over a 500 ft. long reclaiming tunnel that serves the two black top plants operated at this site. Recently a 5½-ft. Symons short head cone crusher was installed as a secondary crusher.

This plant was visited to see what effect the so-called "Sand Equivalent Test" had had upon the production of fine aggregates for black top work. In California, the Sand Equivalent Test went into effect about 2½ years ago. In a review article by the author of Rock Products, January, 1953, p. 93, there appeared, for the first time in any publication, a description of the test with an outline of its probable effect on fine aggregate production in that state.

Sand Equivalent Test

The test is a field method of determining the relative amounts of clay, silt, and sand in any given sample. Silt and especially clay in asphalt work, in California, are considered as "lubricants," causing coarser aggregates to move in the pavement. To restrict this possible movement by eliminating the clay, the test was evolved. The test is still effective and in the Sully-Miller plant has required special equipment to adequately wash the fine sand, and to recover it once it has been freed from clay.

The test is carried out by placing a measured volume of sand (to be tested) in a glass graduate along with a specified volume of water. The two are then mixed thoroughly by shaking the column under stated methods. The



One of two bituminous mix plants owned by company for which aggregates are supplied in addition to other contractors' plants

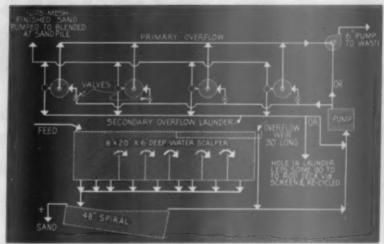
mix is then allowed to settle exactly 20 min. After this period of time a 'weighted foot" is carefully lowered into the column. The weighted foot is a metal rod with a stipulated total weight. One end is a flat disc (about the size of a 25 cent piece). On immersing in the glass column, the disc sinks into the settled sand a certain depth, and the graduations on the glass column permit the field engineer to read off this depth. The material below the disc is considered sand, that above is the clay and silt. The reading at top of sand, divided by the reading at top of clay, times 100 is the "Sand Equivalent." Certain specifications have been set up to specify the percentages, or sand equivalent for the different types of sand. The California State Highway Department, developer of the test, does not specify that sand has to be washed, but the net result of the test has made it necessary to wash all sand to meet the test requirements. In bituminous work a "mineral filler," is usually an ex-tremely fine sand. The problem then becomes one of recovering a fine sand in the 100 to 275 mesh range to act as the mineral filler, yet eliminate the clay and silt that is the offending lubricant in black top work.

The plant of the Sully-Miller Contracting Co. is in the Santiago drainage basin near Orange, Calif. Several other aggregate producers are also in the area. Clay in the deposit is present and a problem. At the Sully-Miller Contracting Co.'s operation, the minus 4-in. material from the 15- x 36-in. Pioneer primary jaw crusher is washed through a rod deck and a tumble screen sufficiently to clean the particles. Hewitt-Robins screens do additional washing and rinsing. A Stephens-Adamson screen is in the secondary crusher circuit.

Fine Sand Recovery

Of primary interest is the method of recovering the extremely fine sand by the use of four 10-in. Krebs liquid cyclones (Model EE-10-9). The four cyclones, operated in parallel at 20 p.s.i., receive a feed of thin pulps by means of a Pettibone-Mulliken Corp. pump. A control valve is inserted in the line ahead of each Krebs unit. The Krebs liquid cyclone is made by Equipment Engineers, Inc. At the Sully-Miller operation, the recovered sand is in the minus 200 to 325-mesh range.

The first step in the recovery process is the use of a so-called "specific gravity" tank, or water-scalper. This tank is roughly 20 ft. long, 8 ft. wide and 6 ft. deep. In vertical cross section, it is cone-shaped. At the discharge end is a weir, extending part way around the sides and all of the end, which has



Flowsheet of send recovery section of plant showing water scalper, sand spiral, and the battery of liquid cyclones

a total length of about 30 ft. The tank is divided into six compartments. The compartments at the feed end and at the discharge end are slightly larger than the other four. Coarser sand settles in the first compartment and progressively finer sands in the remaining compartments. The baffles forming the compartments are about 3 ft. high, extending from the bottom upward. Pulp flows into this tank at the rate of 600 g.p.m. from a 6-in. Galigher pump, with the sand content being 100 to 150 t.p.h., depending on pit conditions. The pool area is sufficient to drop out practically all the plus 200 mesh sand. The discharge gates are essentially slide-type units. An attendent controls the outlets. All sand from the water-scalper flows to a 48-in.

Wemco sand spiral that acts as a dewatering and mixing unit. Sand from the sand spiral moves by belt conveyor to the storage pile. The overflow from the Wemco and the overflow from the 30 ft. long weir of the waterscalper is pumped into the Krebs cyclones.

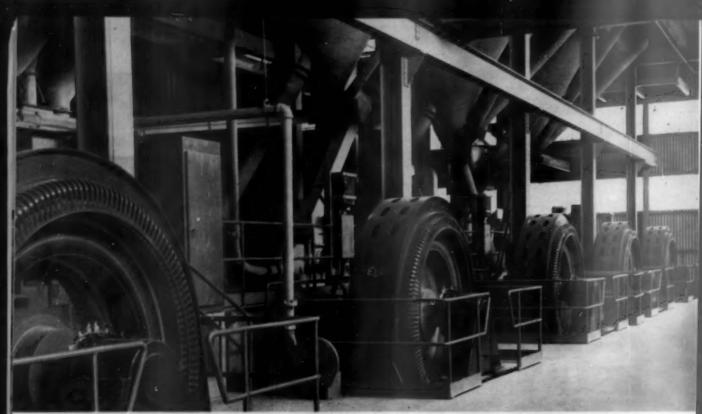
The Krebs liquid cyclone is essentially two cyclones operated in series. Pulp is pumped tangentially into the upper cone where a primary overflow is produced. The underflow passes into the lower cone where a secondary overflow and the finished sand are produced. No attempt is made at the Sully-Miller operation to maintain a ropy discharge, for the cones are high enough in the structure to be re-cir-

(Continued on page 190)





Left: Close-up of 48-in, send preparation mechine which dewaters sand from water scalper, Right: One of four 10-in, liquid cyclones which recovers minus 200 mesh sand. It also recovers 97 percent of the plus 275 mesh sand



Drives for two raw mills at far end and three clinker grinding mills are 1000-hp, synchronous motors. Air separators for both raw and finish grinding are seen overhead

GRINDING MILL

Layout of Dragon Cement Co. Stresses

IN THIS ARTICLE

. . . is discussed a new grinding mill department for a dry process cement plant that differs markedly from the average flowsheet. Here, the feed for both raw and finished grinding is first put through mechanical air separators. The rejects comprise the feed into the mills and, in each case, a single bucket elevator delivers both the mill product and fresh feed overhead for feed into the air separators. Feed materials for both the raw grinding and clinker mills are proportioned; then they are crushed and put in bin for feed, by variable speed feeder, into the separate mills.

THE NEW RAW AND FINISH MILL DE-PARTMENT completed in 1954 at the Northampton, Penn., plant of Dragon Cement Co. is an excellent example of compactness and simplicity of layout. Its use of automatic control devices, choice of single-stage closed-circuit grinding circuits with large diameter ball mills, and the stress on labor conservation, safety and design for ease in maintenance are particularly noteworthy.

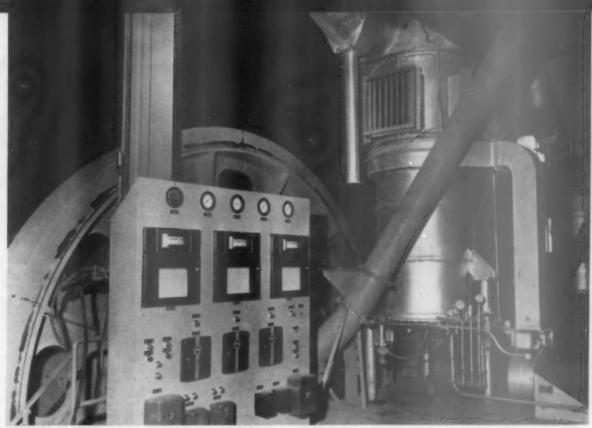
The new facilities replace a grinding department that comprised twostage grinding for both raw materials and clinker. Preliminary mills were in closed circuit with vibrating screens. Finish grinding of raw materials was in open circuit tube mills and, for cement, in tube mills closed-circuited with mechanical air separators.

Grinding mills and related machinery are housed in a single structure built adjacent to new storage silos for raw materials, cement clinker and gypsum. Location is on the site of old, small kilns that had been dismantled earlier, and the structure forms the short leg of an L with respect to the rotary kilns.

The plant has three 9- x 314-ft. rotary kilns that are among the largest dry process kilns in the United States. They produce 5800-6000 bbl. of clinker per day. Production is of A.S.T.M. types I, III, IA, and IIIA portland cements. A dark-colored cement is also produced for certain customers. A fourth kiln of identical size and type is now slated to start production and the new mill department was designed accordingly in anticipation of the increased requirements. Rated capacity of the plant will be 2,400,000 bbl. of cement annually. Construction of the mill department was completed without interruption to plant production.

The building is about 120 ft. long and 65 ft. in height, requiring the use of an elevator for workers to reach the top of the adjacent silos. It was built of reinforced structural concrete and steel, with a precast concrete slab roof, and part of its siding is of Corrulux to admit daylight. Mercury vapor and incandescent lighting was also provided.

Generous clearances overhead and roominess around the machinery on all floor levels were incorporated into the design, for safety and to facilitate



Each row mill circuit has vertical ail-fired furnace supplying heat into overhead air separator. Thermocouples at three points indicate temperatures on instruments. Temperatures are also recorded. Pipe carries rejects from air separator into feed end of mill

Safety, Simplicity and Easy Maintenance

the repair and maintenance of machinery. The many stairways available to conserve the energies of mill room workers are of substantial construction with hand rails everywhere, and the guarding of moving machinery and their drives is so complete and thorough that it would be difficult indeed for any wide-awake worker to be injured.

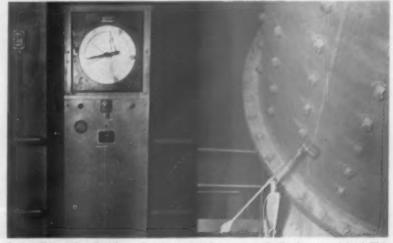
The building was constructed so that it can easily be kept clean and good housekeeping is continuously practiced. Floors are of finished, smooth trowel finish concrete surfaces which permit highest efficiency from powered floor sweepers with minimum wear on the brushes. There are 10 bag-type, automatic dust arrestors in this one building, with a combined capacity of 83,500 c.f.m. Seven of them vent five grinding circuits and the others are for related material handling operations.

Mill Features

The use of silos rather than large open storages for raw materials, clinker and gypsum, has simplified layout. Grinding equipment for raw materials

By BROR NORDBERG

consists of two large diameter ball mills each in closed circuit with a mechanical air separator and there are three closed-circuited mills for grinding clinker. Large circulating loads are carried in all mill circuits. Proportioning equipment is located beneath the adjoining silos on the lower level which is continuous with the floor level of the mill building. Proportioned raw materials are crushed and screened to a top size of ¾ in. and



Each mill is equipped with an electric ear to adjust automatically the rate of feed. This sonic device records noise level in decibles an instrument to the left



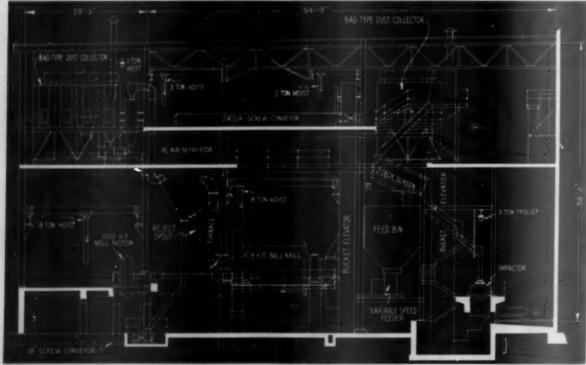
Layout and flowsheet of entire mill. Cement rock available from old quarry and new quarry under development with trucks delivering from new quarry for transfer to cars run on incline

put in surge bins for mill feed. Similarly, proportioned clinker and gypsum are crushed to 1/4-in. top size and placed in surge bins for mill feed.

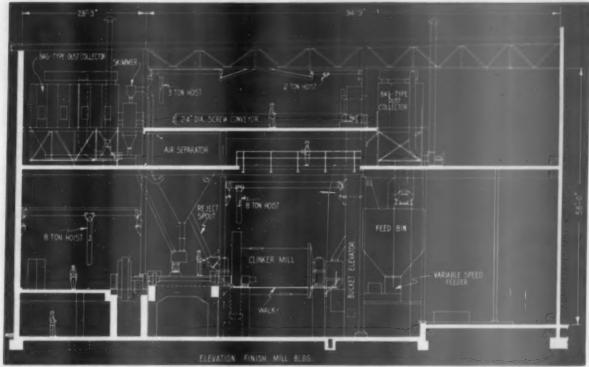
For all five mills, feed is first to the mechanical air separator via bucket elevators and screw conveyors and the rejects are the feed into the mills. It was necessary to dry the raw materials before feeding into the raw mills by supplying heated air through the air separator.

rators, so it was decided to handle the feed into the clinker grinding mills to conform with that system and thus have a simple layout with savings in conveying equipment, elevators and in space. Common overhead trolleys for hoists serve both the raw and clinker departments.

Storage capacities for feed materials are relatively small in preference to having large investment in extra reserves for breakdowns that occur relatively infrequently. Rather, it was decided to build a grinding department that would be dependable, provide easy access for maintenance, and then set up a regular program of inspection to guard against failures. Each Thursday, from 7 a.m. to 3 p.m. is set aside as a maintenance shift. Operations are conducted 20 shifts a week, with certain variations to conform with peak



Vertical section of row mill department showing reduction crusher and feed arrangement whereby mill is fed rejects from air separator. Heated air is supplied to air separator by oil-fired furnace



Elevation of finish mill showing one of three grinding circuits. Mills are fed rejects from air separators. Cooling air is drawn through separators by dust collector fans

power demands. Objectives of the engineering design have proved out, based now on more than a year's operating experience. The clinker mill started up in January, 1954, and the new raw mill in March, 1954.

This is one of few plants in recent years to install sonic devices to regulate automatically the level of material in the mills for optimum output. It has proportioning feeders on both the raw and finish sides that are automatic in the sense that they will cut out if the proportions vary from within a very close holding range. Temperature of the heated gases drawn through the raw mill air separators is also automatically regulated.

Electrical interlocking is employed through the mill as a safeguard. Belt conveyors delivering raw materials into the silos are interlocked, all equipment from the proportioning feeders through the crushers and into the mill feed surge bins is interlocked, and also the grinding circuits.

All the electric motors are provided with individual lockout switches so that none of the motors in an interlocked circuit may be started up after a shutdown until the worker with the key for a lockout releases the motor that was out of service. Special control panels were provided for the proportioning equipment, the milling operations and a master panel for all the equipment involved.

The entire mill is operated by four men, including the miller, a man on the air separator floor, a scale man and a laborer. The arrangement is such that cement types I and III may be ground simultaneously.

Raw Materials

Principal raw material is cement rock from the company's nearby quarries. Over the years it has been necessary to ship in limestone from outside sources, as most Lehigh Valley cement manufacturers do, to raise the CaCO_a content of the mix. While the new grinding mill department was under construction, the company has been in

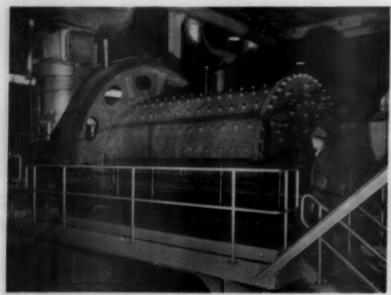
process of opening and developing a new quarry nearby the quarry that has been operated for some 50 years.

The stone in this quarry has a more ideal analysis for cement manufacture and when the shift over to this source of supply is made completely it will be unnecessary to intermix high calcium limestone for mix adjustment. Also, it will be unnecessary to add an outside source of siliceous material, and the addition of iron-bearing material will be reduced and possibly eliminated. As this article is written, cement rock is being delivered to the plant from both sources.

Cement rock is crushed through a



Power shovel and one of the large capacity trucks operating in new quarry



One of two raw grinding mills. Heated air is supplied into mechanical air separator by vertical, oil-fired furnace on left

36- x 60-in. Fairmount roll crusher followed by a No. 7 Williams Jumbo hammermill and the product is conveyed into rock storage. Cement rock is dumped into an 80-ton track hoppered bin on the northeast side of the new silos. High calcium limestone and iron ore are shipped in by rail and they are discharged into a second hoppered bin of 40 tons capacity. A car shaker over the limestone hopper loosons materials in freezing weather.

It will be noted from the accompanying flow sheet that the silos, which are hoppered bottom with 45deg. slopes, are arranged in two rows of three with two interstices. Those to the east are numbered 4, 5 and 6 and are for raw materials. Silos 4 and 5 are for cement rock which com-

prises 75-80 percent of the raw mix, and number 6 is for high calcium limestone (95 percent CaCO_a) shipped in from the Lebanon Valley. Capacity is 3500 tons in each silo. Silos 1, 2 and 3, are for clinker and each has a capacity of 22,000 bbl. Silo No. 3 is set aside for high early strength cement clinker. Interstice bin number 7 is for iron-bearing material which is a copper-iron refinery slag (53 percent Fe₂O₃) and gypsum is stored in interstice bin No. 8.

Gypsum is delivered in hoppered cars at a siding alongside the silos to the east. It is fed into a bucket elevator from the track hopper by a vibrating feeder, the elevator transfers to a second bucket elevator and a 20-in. belt conveyor overhead delivers into

bin No. 8. Silica sand (98 percent SiO_a) is delivered by truck and discharged into a 60-ton bin under the railroad directly east of silo No. 4. **Material Handling**

Cement rock, limestone and iron ore are separately discharged from their track hoppers to a 30-in. inclined belt conveyor, 375 f.p.m., delivering to a second 30-in. inclined belt conveyor at right angles which has slightly higher speed. The second belt conveyor discharges to a poweroperated turnhead for distribution into the silos. Cement rock is delivered into its two silos from the turnhead by gravity, as is the iron ore, and limestone is transferred by an overhead belt conveyor into its silo.

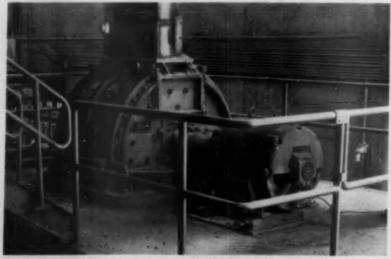
The power-driven turnhead is operated from the main track hoppers below where, by pre-selection, the operator fills silos Nos. 4, 5 and 7. Silo No. 6 may be filled through operation of the turnhead, when the overhead 30-in. belt conveyor is in operation. Daily inventories of the height of material in the separate silos are taken and lights at the hopper operator's station indicate which silos are to be filled. This conveyor system is electrically interlocked.

Clinker that has been cooled over inclined-grate, clinker coolers to 125 deg. F. is elevated to enter the mill building and then is conveyed by bucket elevator and belt conveyors to the silo roof. Through the use of slide gates overhead, clinker is discharged into silos Nos. 2 and 3, and by drag conveyor into silo No. 1.

Raw Grinding

Raw materials and also the feed for the clinker mills are proportioned by Jeffrey Waytrol constant speed, variable weight feeders that are electrically interlocked to hold the desired proportions within close limits. Four of these units serve the raw mill and there are five for the clinker mills. Weight adjustments are made on the scale arms. Two size number 450 units, a size 330 and a number 220 proportion the cement rock from either of the two silos, the limestone, the iron-bearing slag and the sand.

Controls for the feeders are centralized on a Fuller control panel, where there are red and green blinking lights which, alternately, indicate variations in feed under and over the fixed rate. Should either be on light for ten seconds an alarm is sounded, and if a second 10-second interval transpires, without correcting a condition in need of attention, the entire electrically-interlocked system from the feeders on to the mill feed bins will stop. These lights alternately light at frequent in-



Impact type mill closed-circuited with overhead vibrating screen for reduction of raw materials to %-in. top size for raw mill feed



View illustrates the extensive use of dust collectors and cleanliness of the mill. Horizontal screw conveyors transfer material delivered from enclosed bucket elevator in each case (five) into mechanical air separators. In background may be seen some of the grinding circuit dust collectors. Unit in foreground is for venting clinker crushing and handling equipment

tervals, under normal conditions, as compensating adjustments are being made to hold the desired rate of flow. Lights on the master panel indicate the offending equipment.

Delivery of proportioned cement rock, limestone and iron ore is to a single 18-in. drag conveyor parallel to the row of three silos, which transfers to a second drag conveyor, at right angles, delivering to the boot of a 110 t.p.h. bucket elevator. Sand is delivered by a Carrier oscillating conveyor from its bin to the junction of the two drag chain conveyors.

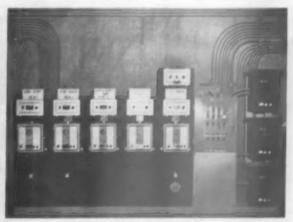
Material is elevated and put over a type F-600 Ty-Rock 5- x 12-ft. vibrating screen. The screen is in closed circuit with a No. CF 7-38 Pennsylvania reversible impactor crusher which takes the rejects. The screen has 3/4-in. clear openings to determine top size but carries a top deck of 1-in. openings to take wear. Circulating load in the circuit ranges from 100-200 percent. Throughs from the screen drop into a surge. bin, which has two draw-off pockets for mill feed. Their capacity is sufficient for two hours operation of the raw mills. Bindicators

actuate lights on the control board when the surge bin is full.

The grinding circuits each consist of a 10-ft. 6-in. x 15-ft. Allis-Chalmers ball mill (2), in closed circuit with a 16-ft. Sturtevant mechanical air separator. Feed is into the air separator and the rejects are fed into the mill. Fresh feed material enters the circuit from an adjustable speed feeder supplied from the surge bin and delivering into the boot of a 350 t.p.h. enclosed bucket elevator which also delivers the mill discharge stream overhead to the mechanical air separator.



Left: One of the scales used for proportioning separate materials for both raw and finish mill grinding. These feeders are interlocked for the separate materials and do not regulate rate of feed



into grinding mills. That is done later in the process by variable speed feeders. Right: Electrical control panel for proportioning scales beneath storage silos



Oscillating conveyor delivers gypsum from proportioning scale to join clinker from separate scale into drag chain conveyor. This scale is set for use when grinding high-early-strength cement

Transfer into the air separator is by a 24-in. screw conveyor. Circulating loads carried are 500-600 percent in producing 185 bbl. per hr. (575-lb. bbls.) from each mill. The product is ground to a fineness of 88-90 percent passing a 200-mesh sieve. It is discharged from both air separators to an 18-in. screw conveyor and is elevated into storage tanks. From these tanks, the material is withdrawn and put into two 40-ft. diameter by 40-ft. high blending silos. Blending is accomplished by aeration before transfer for kiln feed.

Feed into each grinding circuit is by a 30-in. Schaffer Poidometer which serves purely as a variable speed feeder for material that has already been proportioned and inter-blended in process of handling. They have Adjusto-Spede

drives to control the belt speed, and the rate of speed is set on the lever arm to function between minimum and maximum limits. Rate of feed into each mill, and into the clinker mills as well, is automatically controlled by a Hardinge electric car. This sonic device incorporates a microphone placed near to the mill shell near its discharge end and is set to maintain a desired sound level. The weigh belt speed varies automatically to hold the sound level which is set according to the level in the mill which results in maximum grinding efficiency.

Each raw mill is driven at 18.5 r.p.m. by a 1000-hp. Electric Machinery and Manufacturing Co. synchronous motor. These motors have the d.c. inching device for spotting the

mill incorporated into the electrical circuit, to facilitate ball charging. They are direct drives, connecting to the mill gears through rigid couplings and long shafts which provide flexibility. The grinding charge consists of 65 tons of graded forged steel media comprising 1, 1¼, 1½, 2, 2½ and 3-in. sizes. Makeup balls are added once a week into these mills (also the clinker mills) and a standardized procedure is being developed whereby the correct ratio of ball sizes in the optimum size ranges will be regularly added.

Heated air for drying the raw materials in process is supplied from a Todd vertical-type oil-fired furnace at each mill, and is drawn through the mechanical air separator by the dust collector exhaust fans. There are two Norblo bag-type dust arrestors of 9000 c.f.m. capacity each for each raw mill set-up. They discharge through pneumatic rappers and the dust is spouted into the screw conveyor transporting the air separator product to storage.

The furnaces are rated at 9 million B.t.u. per hr., maximum capacity, and firing is controlled by three thermocouples in circuit with fuel valve and dampers. One thermocouple is just above the combustion chamber, another records the reading just ahead of the air separator, and the third is on the discharge side of the dust collectors.

Firing rate is adjusted to decrease the moisture content of the raw materials from an average of about 2½ percent water down to two-tenths of one percent. This requires a temperature of about 1200 deg. F. in the combustion chamber, and from 600-700 deg. F. upon entry into the air separator, in holding the temperature to 180-200 deg. F. just out of the dust collector. The latter temperature is the critical measurement, the problem being to keep above the dew point and yet not to permit excessive heat in the bags.

Should temperatures drop too low, the oil valve opening admits more fuel to the burner tip. When temperatures become too high, the oil valve is cut to minimum opening and louvres are opened to admit cold air into the system. Furnace operation is entirely automatic and all controls, recording and indicating instruments are centralized on panels at each furnace.

Since combustion air from the furnace fan is drawn through the air separator and dust collectors, the bags are of Orlon for added resistance to sulphate-gases and for high temperature. The dust collectors for the grinding circuits in both the raw and finish mills have Buell LP type scalpers ahead of them to reduce bag wear.



Each mill circuit is fed proportioned materials by a variable speed feeder, speed of the feeder being regulated through an electric ear to maintain best level of material in the mill. Fresh feed discharges into elevator to be put through overhead mechanical air separator, along with mill stream product. Rejects from air separator are fed to the mill

Elevators, screw conveyors and the air separators are covered with brick-type insulation and finished off with insulating mortar to a total thickness of 3 in.

Clinker Grinding

Clinker storage in silos numbers 1, 2 and 3 provide a reserve sufficient for 12 days operation of the finish mills, and silo Number 3 is set aside for high early strength cement clinker.

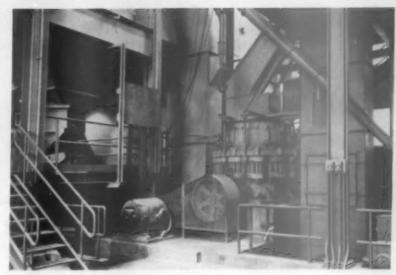
Below each silo there are separate No. 450 Waytrol proportioning feeders and there are two No. 220 units for gypsum. One is set for standard cement grinding and the second is for proportioning with high early strength cement clinker and that feeder delivers to a Carrier oscillating conveyor for transfer to the main conveyor. Proportioned material is conveyed by drag conveyor to a bucket elevator delivering into a 4-ft. Symons cone crusher for reduction to 3%-in. top size in open circuit.

From the crusher, the material is elevated overhead into a surge bin for mill feed that has capacity for 3½ hr. of mill operation. This bin has three hoppered divisions for drawoff of feed at three points. Two are filled directly from the bucket elevator and the third by a drag conveyor.

Grinding circuits are similar to those in the raw mill in that feed is first elevated to be put through a 16-ft. mechanical air separator in each case and rejects are fed the mill. The air separators have special, serrated wear plates and the principal signs of wear after more than a year of operation, have been in the upper end of the cone. Abrasion and not the impact from the clinker is the cause of the wear. The use of Ni-Hard liners or other abrasion-resisting liners is to be tried. Fresh feed is supplied by 30in. Poidometers into a bucket elevator from which the air separator is fed via 24-in. screw conveyor, and the feed rate is regulated by the electric ear. Rejects are the feed into the mills and circulating loads carried are about 650 percent. Like in the raw mill, the elevator carries both the fresh feed and the mill stream product.

Each circuit is vented by a single 9000 c.f.m. Norblo bag-type dust arrestor which also draws air through the air separator to cool the cement. Buell skimmers precede each arrestor and the dust is discharged from the collectors to join the stream of finished cement at the cement pump hoppers.

There are three 10-ft. 6-in. x 16-ft. Allis-Chalmers ball mills with drives identical to those in the raw mill. They carry a ball loading of 144,000 lb. graded between 1- and 3-in. sizes.



Proportioned clinker and gypsum are reduced to %-in, top size through this crusher and elevated to clinker mill feed bins

Production is 120-135 bbl./hr. of type I cement per mill, ground to a fineness of 1700 Wagner and, for type III cement, the output is 60-80 bbl. per hr. for a single mill. Type III cement is ordinarily ground through one of the mills, and that mill is so arranged that it may also grind type I.

The layout is such that finished product (type I) from No. 1 and No. 2 air separators is spouted to an 8-in. type H2 F-K pump for transport to the cement silos. A separate 6-in. type H F-K pump handles type III cement from No. 3 air separator. Should No. 3 mill be used for type I cement, a F-H airslide delivers the air separator product to the 8-in. F-K pump.

Vinsol resin is added at the point of feed of the air separator rejects into either mill, in the manufacture of air-entraining cements. There are continuous samplers in the discharge lines from both pumps, and thermometers as a check on cement temperatures.

The three 9- x 314-ft. rotary kilns are of Smidth manufacture and have Unax integral coolers. They are fired a mixture of anthracite and bituminous coal by 6- x 8-ft. direct-firing, Smidth Tirax mills. These are airswept tube mills of compartmented type. Kilns are fed by screw conveyors of non-flooding type which turn in close tolerance piping. Each conveyor has a surge box arrangement to make adjustments for fluctuations in feed supply. A similar arrangement will be used when the fourth kiln is installed.

Clinker discharge through the integral coolers is crushed through three hammermills and then further cooled over two No. 625 Fuller clinker coolers before delivery into the clinker silos. Cement storage and packing facilities have not been changed in recent years. Packing is done by four 150 FC St. Regis packers and both sacked and bulk cement are shipped by rail from this plant.

New Quarry

Part of the cement rock presently being put through the mill is from the new quarry under development on a 77-acre tract of land. Stripping started more than a year ago and the overburden was used in levelling for a 40ft, wide all-weather road, a mile in length, to the existing crusher building.

There will be five Euclid, end-dump trucks in service, with one as a stand-by, hauling stone when the fourth kiln is started. They are powered by 300-hp. Cummins diesel engines, have power steering and power brakes, and haul 22 tons to the load. A 2½-cu, yd. diesel-powered Northwest shovel is used for excavation.

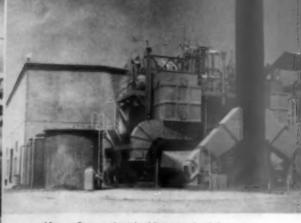
Officers - Personnel

General design of the new raw and finish mill, and the overall improvement program, was under the supervision of W. H. Klein, vice-president in charge of production. Detail engineering was by E. L. Heidenreich, Jr., consulting engineer.

Thomas J. Hynes is superintendent of the plant and Frank J. Anderson is chief chemist.

Officers of the company in addition to Mr. Klein are James H. Ackerman, president; John M. Pomeroy, vice-president; R. B. H. Smith, vice-president; Robert J. Unger, assistant to the president; Albert H. Schaefer, secretary; John K. Cillery, treasurer; and Fred Meissner, assistant secretary and treasurer.





Above: Power plant building, to the left

Left: Five 10- x 350-ft, dry process kilns

West Coast Cement Manufacturer Installs Waste Heat Boilers

MORE POWER

. . . and recovery of stack dust were two of the important accomplishments of the new waste heat boiler and power plant installation at Riverside Cement Co., Oro Grande, Calif. Nearly \$4,000,000 was spent for improvements.

ONE OF THE MOST COMPLETE WASTE HEAT AND POWER PLANT INSTALLATIONS to be found anywhere was placed in operation by Riverside Cement Co. at the Oro Grande, Calif., plant early this year. Along with other improvements, the cost is estimated at nearly \$4,000,000.

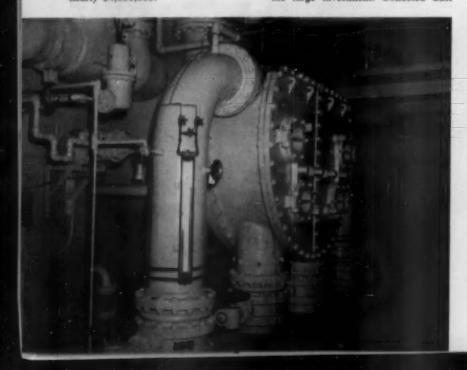
A reduction in dust losses was one of the primary purposes of the installation. For every 100 units of dust previously lost, only 50 units are now wasted. The generation of more than enough power to run the entire plant plus the dust recovered amply justify the large investment. Collected dust

is returned to the system. To accomplish the same results, the waste heat installation was considered cheaper as to first cost than the cost of additional dust collection equipment when other factors are considered.

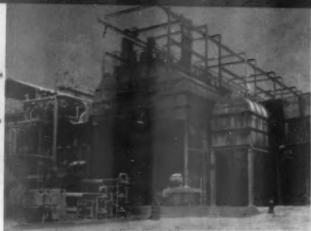
The Oro Grande plant has had a rather unusual life. The old, original plant was shut down in the late 20's with operations resuming in 1941. Almost simultaneously a building program went into effect whereby the operation was completely modernized and progressively expanded. In Rock Products, August, 1948, there was a description of the building program. Since then two more kilns have been added, bringing the total to five 10- x 350-ft. F. L. Smidth & Co. rotary kilns.

Another improvement at Oro Grande is the use of pressurized steel storage silos to thoroughly mix the raw ground materials. Compressed air is introduced into the material to be blended through specially designed openings in the base of the silo. The air stirs, rolls, and mixes the material so that uniformity is obtained and this results in a constantly highly uniform quality product going to the kilns.

There are five Combustion Engineering Co. waste-heat units, making a total of seven boilers in the new setup. Construction of the plant started May 1, 1954, and went into operation March 15, 1955. The power plant



Left: Circulating water inlet at No. 1 condenser



Above: Waste heat boilers between kilns and dust collectors

Right: Close-up of waste heat boilers



By WALTER B. LENHART

On Long Dry Process Kilns

was designed and built by the Bechtel Corp. To augment the waste heat plant, two oil-fired boilers were also installed.

The boiler installations operate at 600 p.s.i. which is said to be high pressure for most industrial plants, and also as applied to waste heat systems normally used in portland cement operations. The steam temperatures at that pressure are in the 825 deg. F. range. Each waste heat boiler is rated at 20,000 lb. per hr., and the oil fired boilers at 40,000 lb. per hr. Each waste heat boiler has an output equivalent to 2000 kw. Coen oil burners and registers are used on the two oil fired boilers.

The waste heat boilers were installed between the kilns and the Multiclone dust collectors. The electrostatic precipitators follow the Multiclones. Both types of dust collectors are Western Precipitation Corp. units.

Effluent gases from the five kilns have a temperature from 1200 to 1400 deg. F. After passing through the waste heat boilers, these hot gases are reduced to 350 to 400 deg. F. This reduction in temperature means a corresponding reduction in the volume and velocity of the gases. These factors all add up to far better operating efficiencies in both the Multiclones and the electrostatic precipitators. Formerly the plant operated with four stacks. Three of the stacks have been

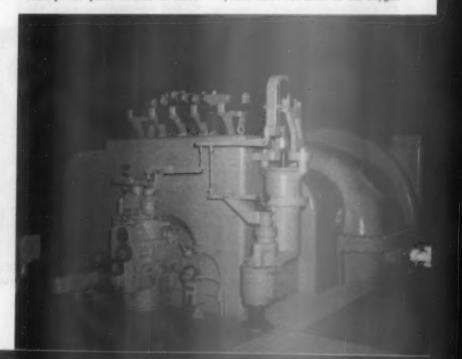
dismantled, and now the entire plant operates from a single 200-ft. stack. All gases flow through a balloon-duct to the single stack.

The steam produced operates two General Electric Co. turbine generators each rated at 7500 kw. Primary voltage distributed to the cement plant is 2400 volts. The maximum capacity of the new steam plant is 18,500 kw. The above rated 7500 kw. is at a power factor of 0.8. The turbines, which are directly connected to the generators and to the exciters, operate at 3600 r.p.m.

The power plant is able to more

than take care of all the plant needs, which are in the 12,000 to 13,500 kw. range. On the vacuum side of each turbine is a 9000 sq. ft. Elliot surface condenser.

The boilers are fed by three 8-stage Byron Jackson centrifugal pumps that obtain suction from a Permutit, deaerating feed water heater. The Permutit heater draws heat from one of the stages in the turbines. Ahead of the feed water heater is a deaerating system, consisting of baffles in a suitably enclosed tank, the assembly being connected to a vacuum pump. This system takes out most of the oxygen



Right: One of two 7500 kw. turbines, showing automatic controls



Left to right: Power plant foreman, John A. Fuller, at the turbine control board; upper right may be seen 48 indicator windows; Dave Falkenhayn, control room operator, at the oil-fired boiler control board; and James Gray at the auxiliary board, pump and cooling tower controls

with the heating system removing the remainder. Removal of the oxygen in the water reduces corrosion. A Westers by two Byron Jackson, 9000 g.p.m. (each), single stage, vertical mixed, centrifugal flow pumps. Additional

Control room aperator, Dave Falkenhayn, at his post. This view shows about one-third of the instruments in this room

inghouse evaporator is available for make-up water for the boilers. Circulating water from the condensers goes to a three-cell, Fluor Corp. cooling tower and is returned to the condenscooling water for generator cooling, turbine oil cooling, and bearing cooling is obtained from two Wintroath surface water, centrifugal pumps. Cooling tower make-up water, which

is furnished from the cement plant's cooling water, is first passed through coke trays to precipitate the iron and is then pumped by cooling tower make-up pumps to the cooling tower. Water is treated with chlorine to control algea, sulphuric acid to control pH, and poly-phosphate to control sludge. The pH is maintained at 7.5 to 8.0. The water used for tower make-up is normally in the 7.5 to 8.0 pH range, but due to concentration of the alkali portion from evaporation, the acid is added to keep the water in the pH range indicated. The pH indicator is a Beckman instrument but control is not automatic. Acid is fed to the system by hand control based on the pH reading. There is no chemical reaction with the coke when the liquid passes over it. The coke acts as an aerating medium, causing more rapid oxidation of the ferrous iron in the water, changing it to ferric iron in which form it is precipitated as ferric hydroxide sludge.

All major operations of the power plant are completely automatic. The oil-fired boilers have Bailey automatic combustion controls, and the waste heat boilers have feed water controls. There are also automatic governing controls on the generators.



View of 2400-volt switch goor distribution center



The 480-volt station switch gear and motor control



Cooling tower with two 9000 g.p.m. pumps delivering water to All air going into turbine room is filtered; air washer and fan steam condenser



may be seen to the rear

The main control room has 20 recording instruments. Minneapolis-Honeywell recorders are used for the generator temperatures, super - heat temperatures, and condenser temperatures. There are two 15-point and one 6-point recorder in the assembly of instruments. Pneumatically operated automatic controls are supplied air by an Ingersoll-Rand compressor.

The control room is glass enclosed and also operates under slight air pressure, and is air conditioned by refrigeration. The operator has phone connections to the plant and outside with a business-like desk spotted for operating convenience. Immediately behind the desk is the electrical control board with the cement plant distribution feeder switches, all controlled from the board. On the left side wall is located the turbine control board. including the waste heat boiler steam flow meters, draft gauges and feed water controls. The main elements here were supplied by the Bailey Meter Co. On the right side wall are the controls for the oil-fired boilers, pumps and cooling tower controls. In each of the two corners formed by the back and side walls are two annunciator panels, each having 48 labelled "windows." When an abnormal condition occurs on important power plant auxiliaries or operations, the associated window is illuminated and an audible alarm sounds. Emergency operations are thereby immediately indicated so that corrective action can be taken without delay. Also conveniently located in the power building, is the 2400-volt switch gear distribution center to the cement plant, and the 480volt station switch gear and motor controls.

Any air passing through instruments must first pass through an air dryer and then through three Bailey filters to remove moisture and any foreign

matter. If, for any reason, the instrument air supply fails, plant air is automatically admitted into the system through air filters from cement plant service air supply.

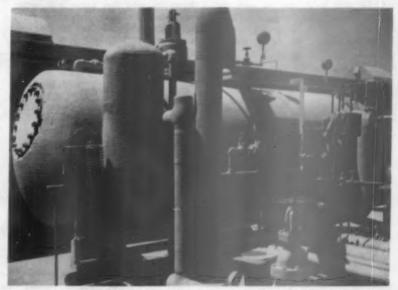
Each of the waste heat boilers is equipped with Diamond Power Specialties Co. soot blowers that are operated from an automatic sequence panel. The five waste heat boilers are equipped with economizers and the two oil-fired boilers have air pre-heat-

All air going into the turbine building goes through a Farr rotonamic filter. In this device outside air is sucked into small cyclone-like units that are only a few inches in diameter. There are several thousand of these units. In the small cyclones, the air receives intense centrifugal action and any dust is thrown to the outer periphery and ultimately falls into a trap

below the assembly of cyclones where a fan picks up the dust and blows it to waste. Air cleaned in the Farr unit then passes to a Buffalo Forge Co. air washer and fan.

The fan delivers 45,000 c.f.m. of air to the turbine building with the air being exhausted at the rate of 34,000 c.f.m. so the building is always under slight pressure. The control room is separately air conditioned by refrigeration.

The load distribution for the cement plant is all handled from the control room. Generators are protected by three G.E. reactors, dry type, which are installed between the generator leads and switch gear. There are two sets of duplex reactors on the tie bus. These reactors were installed to maintain short circuit current conditions within the capacity of the switch gear. The station power plant



Evaporator on the roof is available for make-up water



Buel purpose truck and trailer combination hauf bulk cement to points in Southern California and return with fuel oil to the plant

auxiliary load is supplied by two Westinghouse 750 kv.a, 2400/480 unit substations. A 150 kw. General Motors Co. diesel-electric generator supplies power for cold start-ups. The power plant of the Riverside Cement Co. is completely separate from any other source of power.

The power plant staff includes a power plant operator, a control room operator, and a boiler lancer for each shift. A man is in the control room all the time.

The generators and control room are housed in a two-story reinforced concrete tilt-up panel building with some equipment on the roof. The building is modernistic in design with an attractive main entrance, using duplicate heavy glass doors. The interior of the entire building is kept spotlessly clean. Office space is provided for the plant foreman with suitable files for handling the many chart recordings from the control room.

Bunker C-type fuel oil is used for the oil fired boilers. All fuel oil is hauled to the plant in truck tankers. Four of the trucks (company-owned) carry 6260 gal, of oil to the plant and 125 bbl. of bulk cement on the return trip. These trucks have a horizontal cylinder that holds the oil with the cement being held in separate containers that surround a part of the horizontal tanks. The truck unit has a hopper capacity of 370 cu. ft. for each (truck and trailer), or a total of 740 cu. ft. The truck tank holds 2900 gal. and the trailer 3360 gal. fuel oil. The haulage units were made by the Utility Trailer Mfg. Co. of Los Angeles. The one shown in the illustration is powered with an Autocar diesel tractor.

Garner A. Beckett is president of the Riverside Cement Co.; Howard Starke, vice-president and technical director; John Kinard, general manager; T. F. Tugwell, director of transportation; C. W. Cosby is superintendent of plants in charge of operations at both divisions; J. M. Sauer is in charge of the Oro Grande division. John Fuller is power plant foreman, and A. E. Patch is the Bechtel Corporation's representative assisting Mr. Fuller during the plant's early runs.

Correction

IN THE ARTICLE, "New Study on Reactions in Burning Cement Raw Materials," part 2, appearing in Rock Products, June 1955, pages 102 and 106, Figs. 5 and 6, the "X" point was omitted from the drawings in recopying. These drawings are correctly reproduced below so that those who have followed this series will better understand the discussion in the third column on page 104 and the first column on page 105. In Fig. 8, page 84,

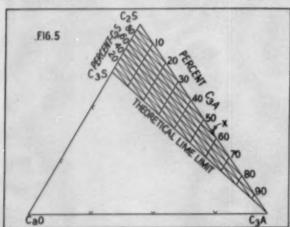
July 1955, the lines drawn parallel to to the C₂S-C₂A line represent 10 percent intervals in liquid content. As the lines are closely spaced, the values were indicated for every other line on the side from C₂A to point D; that is, 20, 40, 60 and 80 percent. These figures in Fig. 8 were incorrectly shown as 20, 30, 40 and 50 percent.

Permanente Has Record Sales

PERMANENTE CEMENT Co., Oakland, Calif., reported a new record high for sales and earnings in 1954. Earnings after Federal income taxes for the fiscal year ending January 31, 1955, were \$5,054,000, or \$1.80 a share, compared with \$4,311,000, or \$1.54 a share in 1953 (a gain of 17 percent). Dividends, including a yearend extra of 121/2 cents a share totaled 90¢ a share for the 1954 fiscal year, compared with 771/2 cents for 1953 (a gain of 16 percent) on the 2,800,-000 shares currently outstanding. Sales and operating revenues of \$39,557,-000 were 15 percent above the previous record of \$34,323,000 established in 1953.

Building East Java Cement Plant

A \$20,000,000 STATE-OPERATED CE-MENT PLANT, with an annual capacity of 250,000 tons, is under construction at Gresik, East Java. Incorporating three rotary kilns, the plant is expected to be in operation in 1957. According to Ibrahim Zahir, director of the project, ten Americans are assisting in the plant construction. Funds for the project were obtained from the Export-Import Bank of Washington, D. C. and are being used only in the building program. The plant, which will be operated by the State Planning Bureau, will supply about one half of the national cement needs.



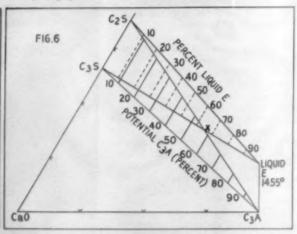


Fig. 5: Final products of crystallisation in the system Cs-Cs-CsA Fig. 6: Persent liquid at 1455 day. (max. heat content) for compositions in the triangle Cs-Cs-x

SHOOTING Interfering Scale Rings With A Kiln Gun

By J. R. TONRY*

 Some helpful suggestions for the removal of scale rings in rotary lime kilns. This information is of similar value in removing rings in cement kilns

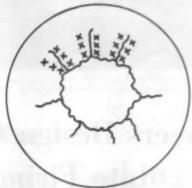
ONE OF THE MOST TROUBLESOME CONDITIONS encountered in kiln operation is the formation of scale rings. They may form slowly, over a period of weeks or quickly, over a period of days. Occasionally a scale ring may build in a day's time. A small ring is beneficial and to be desired for several reasons. However, a point is reached where the kiln is blocked to varying degrees and the ability to burn coal is hampered. Then it goes from bad to worse with loss in fuel at the stack, lowered production and perhaps a low quality product will be the result.

When the ring has grown to the point of interference with operation, then some action must be taken. Either the kiln must be shut off, cooled and cleaned out, or the scale partially removed in some quick manner. There may be several quick methods of scale control, but the one used in this paper is that of shooting with the 8 gauge kiln gun.

Scale rings may be shot out with the 8 gauge kiln gun and a kiln kept running for a matter of days or in continuous operation, as may be desired.

Cutting a notch back to brick on a small or medium size ring may weaken the entire mass and allow it to fall

The nature of the scale ring seems to be of two general types, hard and soft. By "hard" is meant a scale which is generally dark to a little less than black in color, dense and hard. A piece of this scale does not break up at all easily when hit with a sledge hammer. This is by far the most difficult scale to shoot. The slugs from the



A hard scale ring and the suggested starting places for shooting

gun strike and many times leave no mark to be seen. To shoot out a sufficient amount of this ring may require up to 2,000 shells and sometimes more.

Shooting a "Hard" Ring

In shooting a "hard" ring, the best practice is to get the kiln "hot" and then cool for 10 to 20 min. with the hood door open and the draft open. This will cause cracks to appear at the weakest points and give the gunner his targets. Starting on a crack and taking about 6 in. of scale, the slugs will knock out pieces until a chunk may be knocked out of the ring. Shots should not be fired continuously in the same spot as some of the striking effect may be lost. Moving about 6 in. occasionally in a vertical and horizontal direction is most effective. A few shots may crack and weaken a portion of the ring but arch effect will hold it in place. Therefore the placing of shots will help dislodge the pieces. Once a section is cut out of the ring in this manner, it is sometimes advantageous to move around the ring with shots placed about where the final opening will be located, then proceeding around the ring as started. These shots placed on the ring may cause cracks to start, weakening large pieces. The effect will be seen when large sections tumble out with a few shells later on.

Another important factor is shooting at the top or high on the side of the ring. This gives loose pieces a chance to fall out and avoids the placing of slugs in loose material. Besides the loss in effectiveness, small particles of scale may come flying out the hood openings and occasionaly a small piece of lead will ricochet out in the same manner. This is an important consideration in safety and the reason for prohibiting bystanders to watch the proceedings. These small pieces of lead will inflict cuts when they strike. Hot pieces of scale will, of course, burn on striking.

Another important safety item is the hot gun barrel. Severe burns may be caused on touching it. Occasionally a pin will come out of the mounting and allow the gun to fall to one side or leave the target. The adjusting rod for vertical elevation will sometimes



Pattern of placing shots at start of shooting; rings of soft nature

break, allowing the back end of the gun to fall.

There are occasions where a hard ring of small or medium size may be successfully removed by shooting out a notch back to the brick lining. The shrinking of the ring will sometimes

(Continued on page 198)

^oManufacturing Process Engineer, Portland Cement Association, Chicago. Formerly kiln superintendent, National Gypsum Co.



Overall view showing packing plant with overhead silos in foreground; office and machine shop, right foreground; and limestone crushing plant, in center background

Swiss Engineers Design Cement Plant Into Firing End of Kiln

O RGANIZATION OF THE ST. LAWRENCE CEMENT Co., and establishment of its new mill at Villeneuve, Quebec, Canada, resulted from economic studies made over a period of years by

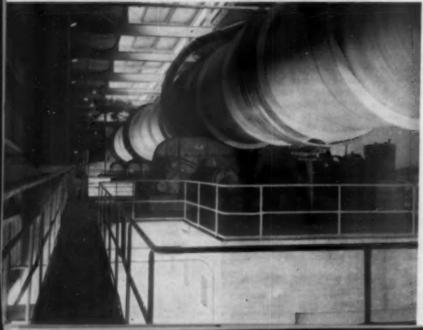
Holderbank Financière S. A. of Switzerland in planning for expansion.

Quebec was selected as the site for a plant because of a favorable combination of economic factors. The province has been undergoing rapid and uninterrupted industrial development which has reflected in industrial and private construction at a pace indicating a long-range favorable market for portland cement.

Transportation facilities are excellent by rail and by highway. The location chosen is on the St. Lawrence River and much of the plant's production will ultimately be shipped by low-cost water transportation. Electrical power is plentiful and at favorable rates. Limestone and shale of suitable quality are available in substantial quantity at the site chosen. In addition, a plentiful supply of labor and technical personnel was available in the area, as was the capital needed to purchase stock. When put on the market, \$3,250,000 of common stock was subscribed for almost immediately. Holderbank of Switzerland, however, has control in the company.

The plant represents a substantial investment of Swiss capital and was built to the basic design and under the supervision of Swiss engineers, who are cement specialists. These engineers have a background of experience in the cement industry throughout the

Kiln, looking toward exhaust end, showing dual drive, consisting of two 100-hp. shunt commutator motors which are balanced and provide variable speed





FOUR MAJOR FEATURES

of St. Lawrence Cement Co. Plant

... are discussed in detail. Here we have the first case in North America of feeding all the stack dust collected into the firing end of a wet process rotary kiln. Storage and packing of cement are done in a novel arrangement that permits gravity flow throughout with marked savings in costs. Large capacity rotary kiln has enlarged diameter preheating and burning zones and internal dam construction to control flow through calcining and burning zones. Raw material composition is held in close uniformity without use of blending tanks

By BROR NORDBERG

This close-up shows use of galleries connecting mill buildings. Grinding mill building is in center of this group tion methods in the new mill that differ from Canadian and American practices and hold special interest, but, it is in the emphasis on detail and perfection throughout the plant that the thoroughness of European technical men was particularly observed.

Villeneuve in five miles northeast of Quebec City on the St. Lawrence River and the plant is just west of the village of Montmorency and Montmorency Falls which is one of the famous tourist attractions of the Province. The plant is on well-travelled Boulevard Ste. Anne which skirts the river. Construction work started in the summer of 1953 and production began in November, 1954, which was some nine months ahead of schedule. Shipments of cement started in January, 1955, and the plant was formally dedicated on June 1, 1955.

Economic Features

The plant has a single, large wet process rotary kiln, and was built at

With Dust Return and Gravity Flow Packing

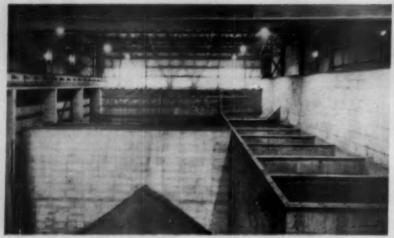
world and much of it has been in other plants of the company. Holderbank has been a cement manufacturer for 50 years and the company has 20 other plants with a combined production of 21 million barrels annually. Their locations are in Switzerland, Italy, Belgium, Netherlands and Greece in Europe, and in Egypt, Lebanon, the Belgian Congo, South Africa and Brazil.

Engineers were selected for their proven abilities in the basic cement operations-electrical, structural, kiln operation, crushing, grinding, chemical-and were put under contract to come from Switzerland to Quebec for establishment of the new plant. Each of these engineers was assigned responsibility for his department and has remained after production started, to correct operating difficulties and get production facilities in shape to turn over to the operating men. Part of their responsibility has been to train Canadian operating personnel who had little or no experience in cement manufacture.

Some of these engineers will leave to take on new assignments elsewhere in the World, while others likely will remain at the plant. The result of their efforts in the Quebec plant naturally reflects some of Holderbank methods and experience in other parts of the world. There are some basic produc-

Discherge end of kiln (firing end) showing fan for inclined-grate clinker cooler, Cooling air for kiln ring is bled from clinker cooler air duct. Above is dust feed bin and to the left is exhaust stack for clinker cooler





Within covered sterage area served by 100-ft, span overhead crane are feed bins for raw and clinker grinding mills. Bins in foreground are for clinker; those beyond are for raw mills. Overflow storage for limestone is beyond retaining wall

a cost of \$13 million. Capacity is rated at 1.5 million Canadian barrels (350 lb.) annually, or 1.4 million U. S. barrels (376 lb.). Thus, the capital outlay is about equal to that for the most modern new plants in the United States. [We refer to Canadian barrels in our references to capacities throughout this article.]

Plant stuctures are built on bedrock which was favorable to costs as compared to many plants which require fill, piling and other support, but this advantage in construction was offset by Quebec's winter climate. Much of the concrete was poured under extremely difficult winter conditions, which were costly and, subsequent to the start of construction, it was found necessary to provide unanticipated special facilities for winter protection. This included gallery walkways be-

Secondary reduction of limestone is through this reversible hammer-type crusher which is fed by electric vibrating feeder

tween buildings, and insulation and special heating provisions for slurry handling. The company owns the quarry property, but quarrying operations and the haulage of stone and shale to the plant are done on contract and the contractor owns the equipment.

The plant layout may be described as parallel design, with a large covered storage area served by overhead crane between the kiln building on one side and a single mill building on the opposite side. A concrete tunnel walkway was provided under the storage area, connecting the kiln and mill buildings. The mill building houses the raw mills and the clinker mills, and the plant compressors are located in a separate room adjacent to the clinker mills. A well-equipped laboratory is housed in a second floor over the mill building, for convenience of the chemists in their quality control work.

The covered storage area and methods for handling materials in storage are similar to practices in many of the newer U. S. plants. Storage is provided under a single roof for clinker, gypsum, limestone, shale and any additive materials such as pyrites or bauxite that may later be required. Limestone and shale are delivered into storage by belt conveyor from the crushing plant. Sized gypsum is delivered into storage from a separate crushing plant. The gypsum crushing plant is supplied stone by belt conveyors either from a railroad or truck hopper. These same conveyors transfer coal and additive materials into storage.

Gypsum and coal are shipped in from Nova Scotia by water and trucked to the plant from government-owned docks in Quebec City. These materials can also be delivered direct to the plant over the Canadian National Railroad.

The accompanying layout drawing of the plant shows the slurry basins near the feed end of the kiln and it will be noted that the cement storage silos and packhouse are sufficiently removed from the mill buildings that truck traffic may be accommodated.

The layout of plant structures is of simplified design and provides for easy enlargement that is already being anticipated. Additional kilns would be installed paralleling the present kiln, and more grinding capacity can be added through extending the mill building in either direction parallel to the kiln. Material handling equipment including the belt conveyors for limestone, shale and other materials have an over-capacity sufficient for 3-kiln operation.

Being located in one village close to another and on a well-travelled boulevard, the company went to ex-



Group of plant efficials and engineers; left to right: Hans Widmer; Edmondo Giannini; George Zulauf, works manager; Martin P. Peeters; Dr. Bernard Ulrich, general manager; Hans Frymann; Jan W. Simons; Herbert Egger; and George Schwander. Dr. Alfred Schneider, chief chemist and Hans Ruegger were absent when photograph was taken

tremes in building a plant that would be an asset to the community and to its workers. Architectural beauty in concrete and steel was achieved, and the plant makes a striking appearance. Its mill buildings are completely enclosed with asbestos-cement siding and with roofs of the same material. Connecting galleries are completely enclosed and the plant overall gives an impression comparable to that of modern industrial factories which process non-dusty materials.

Built of structural steel and reinforced concrete with some concrete masonry in the mill building, the plant is as clean inside as it appears from the outside and it was built so that cleanliness can be maintained. Floors are of smooth-surfaced concrete and are regularly cleaned by powered sweepers. Dust collectors are installed in all departments of dust origin and most of them are of high efficiency, bag-type. There are some 15 dust collectors in the mill and all return dust collected into process.

Heavy manual work has been reduced to a minimum, with overhead cranes and hoists in each department for handling heavy parts. Bucket loaders are used for charging grinding media into the mills and the handling of refractory brick and bags is on pallets moved by powered equipment. Workers need not go outside in extremely cold weather but walk between mill buildings in the protected galleries provided for the purpose. These galleries also serve to carry the compressed air lines and electrical lines for easy access and maintenance. Only the water lines are underground.

Clearances in the buildings are generous throughout, to permit the use of powered maintenance machinery and for ready access to equipment and sufficient headroom is provided for accommodation of large trucks. The kiln supports are used for storage and some of them serve as offices for plant foremen.

The plant is located on an 800- x 1300-ft. tract of land which is completely closed in by steel fencing. Entry is at a watchman's gate where the truck scale is located. All driveways are paved and the land has been completely landscaped. Having electrical precipitators, in series with high efficiency mechanical collectors, an estimated 99 percent of the stack dust is collected and returned into process, the remainder exhausting through a 400-ft. concrete stack. This stack is the tallest in the North American cement industry and its height was established after dustfall studies. The plant level is some 60 ft. lower than the surrounding terrain which was a factor, and it was desired to have added height so that dustfall would be beyond nearby communities.

Thusfar the plant produces only type I portland cement to meet CSA (Canadian) specification A-5-1951 and, on occasion, to comply with A.S.T.M. standards. However, clinker mill grinding capacity will be increased with addition of a third mill early in 1956 to grind type II cement for St. Lawrence Seaway construction. This will require addition of one percent pyrite to the raw mix. The possibility of making masonry cement was also considered in the plant design.

Equipment

Other than in a few major features of special interest, which we stress later, and in many details, general pro-



Limestone and shale from crushing plant are transferred from inclined belt conveyor to shuttle belt conveyor, above the mill feed bins, to fill the separate bins



Plet plan of plant indicating relative location of principal buildings and processing depariments

duction methods are comparable to modern U. S. mill practices. Most of the major machinery and equipment was fabricated in Canada and some came directly from the United States. The only European equipment used were a few items of laboratory equipment and a Swiss-developed alternating-current "Shunt Commutator" motor to provide variable speed for the kiln and three major air fans.

The kiln is direct-fired with pulverized coal by a unit bowl mill and is exhausted by induced draft fan through trical precipitator in series. Clinker is discharged from the kiln over an airports combustion in the kiln.

Milling practices are typical, using open-circuited wet grinding for raw material and single-stage closed circuit grinding of clinker, utilizing large circulating loads. Air is drawn through the mechanical air separators to cool the cement.

Among the major equipment sup-

a cyclone dust collector and an elecquenching clinker cooler and secondary preheated air from the cooler sup-

LIMESTONE AGGREGATE BELT CONVEYOR BELT CONVEYOR SLURRY SLURRY MILLS PROPORTIONING FEEDERS

Flowsheet of open circuit raw grinding through three-compartment mills

pliers and the principal equipment furnished were the following:

Canadian Allis-Chalmers Ltd.-gvratory crusher, rotary kiln, ferris-wheel feeder, raw and finish mills with their synchronous motors, vibrating screens, auxiliary gasoline engine to drive the kiln, and clinker crusher.

Stephens - Adamson Manufacturing Co. of Canada, Ltd .- all belt conveyors, bucket elevators, screw conveyors, dragchain conveyors, screw feeders, shuttle belt conveyors and the wiremesh conveyor for cement in bags.

Jeffrey Manufacturing Co., Ltd.-Waytrol proportioning feeders (13) for all mills and the coal pulverizer, vibrating feeders and conveyor screens.

Fuller Co. - air-quenching clinker cooler, F-H airslides and airfeeders, cement and dust pumps, compressors.

Dorr Co., Inc.-Dorr slurry agita-

Combustion Engineering Corp., Ltd., direct-firing coal mill.

Northern Blower Co.-all bag-type dust arresters.

Pennsylvania Crusher Co. - two Impactor crushers.

Sturtevant Mill Co.-two mechanical air separators.

Canadian Westinghouse Co., Ltd., -unit substations and control centers, all electrical motors except synchronous type and Shunt commutator motors.

Canadian Sirocco Co., Ltd. - all fans and exhausters.

Precipitation Co. of Canada, Ltd.electrical precipitator and Multiclone dust collectors.

Minneapolis - Honeywell Regulator Co., Ltd.-kiln control instruments.

Leeds & Northrup Co.-kiln control instruments.

St. Regis Paper Co., Ltd.—packing machines (3).

Falk Co. - gear reducers on kiln

Canadian Vickers, Ltd. - Wilfley slurry pumps.

Canadian Ingersoll-Rand Co., Ltd. air compressors.

Canadian Fairbanks-Morse Co., Ltd. -railroad track scale.

Brown, Boveri (Canada) Ltd. --Shunt commutator motors, main sub-

Cleaver-Brooks Co. - Two 100-hp. steam boilers.

Galigher Co. - Continuous-type slurry samplers.

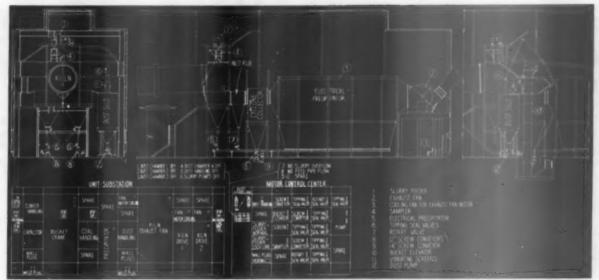
Provincial Engineering Co. Ltd. overhead cranes.

Canadian Kellogg Co., Ltd. - concrete stack.

Buffalo and Roots - blowers.

Johns Manville (Canada) - siding and roofing.

Atlas Asbestos Co., Ltd. - cavity roof decks.



Feed end of rotary kiln, showing dust collectors and handling equipment into dust silo for transfer of dust by pump to firing floor

Outstanding Features

Among features of the plant of special interest are the design of the kiln, method for return of all stack dust collected into the firing end of the kiln, the absence of slurry blending tanks, and the design and construction of the cement silos and packhouse.

The kiln is 402 ft. long, has an 11ft. 6-in. diameter calcining zone and 13-ft. 2-in. diameter enlarged preheating and burning zones. Its production is currently 4700 bbl. of clinker per day and ultimately will be about 5000 bbl. Thus, it likely has the largest output of any single kiln in North America. Aside from its size and dimensions, interesting points are the use of dams in the calcining zone and at the point of discharge. Secondary air for combustion is preheated over the upper end of the clinker cooler and low heat level gases from the cooler are taken off for primary air. The use of two alternating current balanced motors for variable speed drive of the kilns is of special interest. Fuel consumption will be between 900,000 and one million B.t.u. per bbl. when maximum clinker production is reached, which is favorable for a wet process kiln, when fed a slurry of 33 percent moisture content. The kiln is highly instrumented, but practice is to operate it with a minimum of automatic devices.

This is the first plant in North America to introduce all the stack dust collected into the firing end of the kiln. It is projected in the burner pipe by the primary air stream carrying the pulverized coal. The amount of dust so introduced averages 14 percent on the basis of clinker or about

22 percent of the total raw material feed, and it includes all the dust from the Cottrell electrical precipitator.

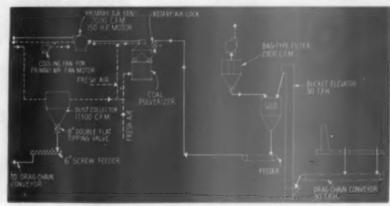
This method of dust return was devised at one of the company's European plants and is patented. At that plant it was necessary to introduce an additive high alumina material into the mix and it was impossible to blend it into the slurry. Injection into the firing end of the kiln was tried and proved to be a solution. Then the method was tried for dust with success. It may prove practical in some American plants where the raw materials are amenable, as to alkalis, and could also be a solution to the pressing problem of dust disposal.

The cement storage and packing arrangement is most unusual and a highlight of the plant. Silos are elevated over the packing and loading stations and supported by reinforced concrete columns. It is a gravity flow design and has eliminated the need for screw conveyors and bucket elevators to serve the packing stations

with cement. This design effected substantial savings in construction for this plant and will result in considerable economies in operating and maintenance costs.

The plant has no slurry blending tanks as such and employs but two large slurry basins. One receives slurry direct from the grinding mills. Transfer is made into the second basin and from there the slurry is pumped into the ferris wheel feeder tank over the kiln. This innovation was tried because the limestone and shale were found to run very uniformly in composition. Close cooperation between the chemist on shift and the mill operator is required and the use of very accurate proportioning equipment. The proportioning is adjusted within close limits according to tests made of frequent samples taken from the mill outlets.

Among other points of special interest are the high degree of instrumentation throughout all departments and the stress paid to having the best



Flowshoot of firing and of kile, including coal-handling

in electrical equipment and control devices. About \$1,500,000 was spent for electrification and instrumentation of the plant. There are unit substations and independent motor control centers in each major department.

CRUSHING and MATERIAL HANDLING

L IMESTONE AND SHALE comprise the two raw materials for cement manufacture in the ratio of about 85-90 percent limestone to 5-15 percent of shale.

Geologically, the limestone is in the Trenton formation and is of the Ordovician period. This formation occurs throughout the St. Lawrence River area and in some areas is classified as "cement rock" because of its similarity to Lehigh Valley stone.

It is grey-blue stone and is almost horizontally bedded and overlaying dolomite at a depth of 300 ft. at Villeneuve. It is uniform throughout at a given elevation. Well stratified, it is somewhat fossilized and has thin beds of clay to various thicknesses from 1 to 12 in. between the limestone layers. Near the top, in some sections, the argillaceous content increases to approach the required chemical composition for raw mix. Core drilling to a depth of 120 ft. revealed presence of a higher MgO content at the lower levels.

The quarry is being excavated on two 30-ft. benches for purposes of selection and inter-mixing to approach a good average chemical composition. An average analysis of the limestone as delivered to the raw mills is as follows:

SiO _a				,								14	percent
Al ₂ O ₂							,					3	percent
Fe _a O _a											,	1	percent
CaO						,						43	percent
MgO												2	percent
Loss on i	gn	út	ic	H	1,		H	di	fı	П			
and unde	te	n	n	ir	10	rd	1					37	percent
											ï	00	percent

Shale is of the Lorraine formation, is of grey and friable material and high in silica. It normally appears above the Trenton limestone to a depth of 1000 ft. but is found on the same level and near the limestone in this area due to heavy faulting in the area. It is vertically bedded.

Chemical composition of the shale is as follows:

SiO _n	0							53	percent
Al _a O _a				0				15	percent
Fe _a O _a								6	percent
									percent
MgO			0					3	percent
Loss on ig									
and undet								15	percent
							1	00	percent

Limestone is drilled by wagon drills. blasted down in shots of 5000 to 6000 tons and loaded by a 21/2-cu. yd. Bucyrus-Erie diesel shovel into Euclid trucks hauling 18 tons per load to the crushing plant. The haul is one mile downgrade to the plant. An allweather road was built by the company from the quarry to the plant and two stop and go lights were installed at main crossroads. Shale is excavated right at the plant using tunnel drilling because of the vertical bedding. Both materials may be stockpiled near the crushing plant for reserve, should cold winter weather curtail quarry operations.

Crushing Plant

Stone is dumped from the trucks into a 42-in. McCully gyratory crusher driven by a 200-hp., 720 r.p.m. motor. Capacity of the crusher is 250 t.p.h. of minus 6-in. product. A 10-ton hand-

operated, traveling crane was provided over the crusher to aid in dislodging hang-ups and for the handling of heavy parts.

Product of the crusher is elevated overhead for secondary reduction by a 36-in. inclined belt conveyor, 160-ft. centers, transferring to a second 36-in. inclined belt conveyor on 122-ft. centers. These conveyors have a capacity of 700 t.p.h., the excess being in event that the plant later be enlarged. Delivery is into a 70-ton cylindrical steel silo from which the secondary crusher is fed. The bin has a conical hoppered bottom and is 12 ft. in diameter. Within the silo, 5 ft. from the top, is a horizontal circular steel plate 6 ft. in diameter to break the fall of the dropping stone.

Secondary reduction is through a CF-15-50 Pennsylvania reversible impactor fed by an electric vibrating feeder. The impactor is driven at 900 r.p.m. by a 400-hp. motor. It is rated at 250 t.p.h. output in producing a T₈-in. top size product in closed circuit with vibrating screens. A water spray is applied over the stone as fed into the crusher to allay dust.

Output of the crusher is divided over two 5- x 12-ft. Allis-Chalmers single-deck Ripl-flo vibrating screens with $_{16}^{-}$ -in. slotted openings. These screens are enclosed and the enclosure is vented to a dust collector. Oversize is discharged from the screens on to the primary belt conveyor, for return into the impactor feed bin. Material passing the screen openings is carried over a 30-in., 250-t.p.h. belt conveyor, 534-ft. centers, delivering into the covered storage area. Shale is handled separately through the crushing plant at specified intervals.

The secondary crusher has an automatic centrifugal-type clutch for direct across-the-line starting. It operates on the weighted principle to en-



Proportioning feeders for raw mills. Those for limestone and shale are rail-mounted and there are two draw-off points from feed bins

gage the crusher when the motor reaches 80 percent of its speed. The impactor rotation is reversed each day. The impactor crushed 225,000 tons of stone before requiring its first change of hammers. They are 110-lb. hammers of manganese steel.

A bag-type automatic dust filter of 11,600 c.f.m. rated capacity vents the crushing plant, including the vibrating screen enclosure, all discharge points and other sources of dust. This collector is one of a number of the same manufacture and type used throughout the plant. Each has an electronic timer for discharge of the dust. Dust in this case is discharged or ... e belt conveyor carrying the finished product into storage. Limestone and shale are separately delivered overhead for direct discharge via shuttle belt conveyor into mill feed bins which are arranged in a row inside the storage area and paralleling the mill building wall.

Covered Storage Area

The covered storage area is 448 ft. in length and the structure is 92 ft. high overall, with 28-ft. high reinforced retaining walls and supporting columns at 32-ft. intervals. Sidewalls above the retaining walls are of corrugated cement-asbestos siding and the roof is of cavity-deck construction covered with 4-ply roofing paper and tar and gravel.

Materials in storage are handled by a 20-ton Provincial overhead crane traveling on rails 100-ft, apart and swinging a 5-cu, yd, bucket. The rails are at an elevation of 66 ft, from the ground level.

This is one of the first overhead traveling cranes in the industry to have a Ward-Leonard d.c. drive which provides smooth and speedy operation.

Storage capacity under cover is approximately 100,000 tons divided as follows:

There are ten mill feed bins within the storage area along the mill building wall, from which materials are drawn for grinding. Five of them are for the raw mills and five for the clinker mills.

Gypsum-Coal Handling

Gypsum and coal or other materials may be received either by rail or truck and separate unloading hoppers are provided for the purpose. Beneath the truck hopper, the flow is regulated by a Jeffrey-Traylor 24- x 48-in. vibrating feeder of 30-50 t.p.h. capacity on to a 24-in., 100 t.p.h. inclined belt



One of a group of three proportioning feeders set up to feed a clinker grinding mill.

Two feeders are in service, one for clinker and one for gypsum

conveyor, 297-ft. centers, delivering into the gypsum crushing plant. Two identical feeders under two track hoppers deliver to a short 24-in. belt conveyor transferring to the inclined conveyor.

At the head of the conveyor there is provision for alternate flow depending upon whether coal, gypsum or other material is being handled and the need for reduction. Material to be crushed is put over a 5- x 12-ft. single-deck, totally-enclosed vibrating screen in closed-circuit, via a 110 t.p.h. bucket

elevator, with a CF-738 Pennsylvania Impactor which has 70 t.p.h. capacity and is driven by a 100-hp. motor. Gypsum as received is up to 6-in. size and is crushed and screened to ¾-in. maximum.

Throughs from the screen, and material by-passing the crushing circuit, transfer to a 24-in. shuttle-belt conveyor alongside the main storage area wall and are placed into storage. The crushing plant is vented by a 6100 c.f.m. bag-type filter and the dust is discharged on the shuttle conveyor.

RAW GRINDING OF SLURRY

L IMESTONE AND SHALE from the limethe main belt conveyor onto a 30-in. rail-mounted reversible shuttle conveyor, 52-ft. centers, over the top of the five raw mill feed bins. A motorpowered winch is used to move the shuttle belt from bin to bin. The arrangement also permits direct discharge from the incoming inclined belt conveyor into the shale bin which is nearest the head pulley.

Grinding is accomplished through two grinding mills in open circuit and five bins have been provided as source of feed. At either end of the row of five are the shale bins and those between are for limestone. When it becomes necessary to add pyrite for the manufacture of type II cement, the two bins nearest the shale bins will be used for the purpose and the center bin be drawn from for limestone supply to both grinding mills.

Design of the feed bins is rather unusual. As seen from the illustration, they are L-shaped in vertical section in order to increase their capacity. The shuttle belt spans the higher level, and material from storage is filled into the bins by the crane bucket at the lower level. Their capacity is 800 tons each,

which is large for mill feed bins. Proportioning feeders under the shale and limestone bins are rail-mounted so that they be moved to take feed from two draw-off points under the bins.

Grinding is accomplished through two 8- x 37-ft., 3-compartment mills driven at 18.7 r.p.m. by 900-hp., 180 r.p.m. synchronous motors through magnetic clutches. Each mill carries a charge of 155,000 lb. of forged steel grinding media. There are 32,000 lb. of 4- and 31/2-in, balls in the first compartment, 57,000 lb. of 2 and 21/2-in. size in the second compartment and 66,000 lb. of 1 and 11/2-in. in the finish compartment. As an experiment, one of the mills has rubber "Linatex" between the shell and manganese liners. Purpose of this spacer is to dampen and reduce shock, which may result in less wear of the liner plate bolts.

Each mill is set up to receive its feed from a combination of three Jeffrey-Traylor Waytrols but only two are presently in use to proportion and feed limestone and shale. The limestone proportioning feeders have a maximum capacity of 60 t.p.h., and those for shale are rated at 0-13 t.p.h. capacity. Additive feeders (not yet in use) have 0-3 t.p.h. capacity.

The Waytrols are electrically interlocked. They are very sensitive in holding the fixed proportions and quickly adjustable, which is of great importance in this plant. With no blending tanks, chemical control of the mix is maintained through adjustment of the proportions according to frequent analyses of slurry samples taken from the mill outlet. Electrical control for the feeders is provided on a motor control panel located in the mill room where there are rheostats for adjusting the feeder vibrators, indicating lights, belt speed selectors, totalizers, switches and other necessary indicators and controls.

In holding the fixed weights, colored lights on the board flash to indicate over-feed and under-feed conditions and, when working properly, these lights flash on alternately at frequent intervals as the feeders adjust to hold the set amount of feed within close tolerances. Should an over- or underfeed condition exist for 15 seconds, an alarm sounds which usually indicates the need for checking the flowout of material to the feeders. If a condition

requiring correction be neglected, and continue for a second 15-second interval, the feed into the mills will automatically stop.

Each pair of Waytrols discharges to a common 18-in. horizontal belt conveyor which feeds into the mill. Water is metered into the mill along with the feed material and the rate of flow is adjustable by a hand valve.

Each mill is producing 50 t.p.h. of a product ground to a fineness of 80 percent passing a 200-mesh sieve and containing 32-33 percent water. Consistency is varied a percent or two to adjust for burning conditions in the kiln. Experiment has indicated that a 31 percent slurry of these materials would be pumpable. However, backflow resulting in the chain section of the kiln is the limiting factor. At the outset, slurry was ground to 90 percent passing a 200-mesh sieve, and coarseness was gradually increased to the present figure based on laboratory studies of burnability and quality of clinker as measured by free lime con-

Typical figures for the slurry and

cement composition are shown in the following tabulation:

Analyses	Slurry	Cement
Loss on ignition	36.00	0.60
8100	14.80	22.20
AloOs	2.70	5.00
FegOs	1.20	2.40
CaO	42.30	63.80
MgO	2.00	2.90
800	0.50	2.40
CaO free	NO.	0.30
Insoluble	-	0.30
KaO NuaO	4000	0.60
CaS	.011	0.30 49.0
CuB	-	25.0
CiA	-	8.5
CAF		7.5
Lime Saturation	-	90.5

Samples of the mill product are taken at each mill outlet by a 24-in. Geary - Jennings automatic sampler. They are taken at 15-minute intervals, mixed every hour, and analyses are made hourly for fineness, consistency and CaCO₃ content. Slurry from both mills flows into a common alurry pit from which it is pumped into the basins. One of two 6-in. Wilfley slurry pumps (one a reserve) delivers into the basins.

Slurry Basins

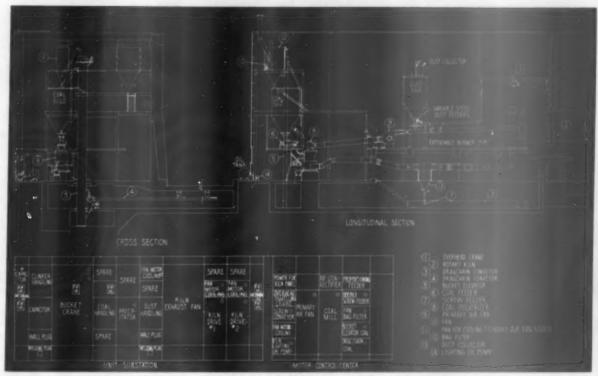
There are two 40-ft. high by 80-ft. diameter slurry basins, designated as the mill basin and the kiln feed basin. Mixing is accomplished by pneumaticmechanical agitators driven by 15-hp. motors. Each basin has a capacity of 11,000 bbl. of slurry and the two combined provide reserve for five days of kiln operation. Between and below the basins is the pumphouse for transfer pumps and those for delivery to the kiln feeder. There are two 6-in. Wilfley pumps (one a reserve) driven by 40-hp, motors for transfer of slurry from the mill basin to the kiln slurry basin. Two 4-in. Wilfley pumps (one a reserve) driven by 50-hp. motors deliver slurry to the kiln feeder.

Normal practice is to pump slurry from the grinding mills into the mill slurry basin for mixing and then transfer to the second tank. However, the piping is so arranged that either tank may be fed direct. There is no provision to circulate back from the second tank to the first, so the analysis of the slurry must be correct once put into the kiln slurry basin. All adjustments therefore must be made at the grinding mills. Samples are taken once a shift from the mill basin and tests are run for quality. As far as holding point is concerned, variations do not exceed plus or minus 0.1 percent CaCO₃. Pumping from the mill basin to the kiln basin is done in the morning and the samples are taken off the surface. A sampler has been developed to permit taking of samples at different levels in the tank.

Kiln feed material is delivered to a 13-in. ferris-wheel kiln feeder which is synchronized to the kiln speed by electrical tie. Excess slurry returns to



Steek dust recovered and pumped into this bin is carried into firing end of kiln by primary air coal stream. Transfer into primary air line is by two screw feeders with variable speed drive



Vertical sections show method of introducing dust into primary air-coal pipe for firing the kiln

the kiln slurry basin but could be returned to the mill basin. Samples are drawn from below the ferris wheel feeder by a 24-in. Geary-Jennings continuous sampler and analyses of kiln feed are made hourly.

Temperatures far below zero this past winter indicated the necessity for

insulating the slurry basins and pipelines. Wooden roofs were built over the basins and they were completely encircled with asbestos sheeting. Slurry lines were covered with 2 in. of insulation and steam lines were embedded inside the insualtion to provide an adequate source of heat.

THE KILN-COAL FIRING

FIRED BY PULVERIZED COAL with preheated primary air and secondary air, the kiln discharges clinker over an inclined grate, air-quenching clinker cooler and exhausts first through a Multiclone mechanical dust collector and then a Cottrell electrical precipitator to the 400-ft. stack. The entire kiln department is enclosed for weather protection and it is proposed that heated air from this building will be drawn into the mill building for winter heating.

Coal is brought into the kiln building from storage by a 30 t.p.h. dragchain conveyor and elevated into a 50-ton circular bin with conical hoppered bottom over the coal mill. Feed into the mill through a rotary air lock is regulated by a Waytrol of similar design to those used in the grinding of raw materials and clinker. Capacity of the feeder and the mill is 3-11 t.p.h., and the air lock is driven by a 2-hp. d.c. motor. Coal is pulverized in a No. 533 Raymond bowl mill driven by a 125-hp. motor. The coal mill department is vented by a 2800 c.f.m. bag-type dust collector and the dust trapped is automatically discharged into the coal mill feed bin.

Preheated primary air for drying the coal is taken off the lower end of the air-quenching clinker cooler at about 550 deg. F. It is taken from the kiln hood when starting the kiln and until sufficient heat is available from the cooler. Heated gases from either source are first put through a No. 36, 17,500 c.f.m. Multiclone dust collector which has an 8-in. tipping valve for release of clinker dust. A 6-in. screw feeder transfers the dust on to the main dragchain carrying the discharge of clinker from the cooler. Tempering air is introduced into the heated air line between the dust collector and the coal pulverizer, and cooling air may also be introduced on the suction side of the blower, into

the line delivering the primary aircoal mixture to the kiln burner pipe.

The coal burned has a heat value of 13,800 B.t.u. per lb., contains up to 38 percent volatiles and has from 8 to 10 percent ash. It is pulverized to a fineness of 80 percent through a 200-mesh sieve and introduced into the kiln by a 7000-16,700 c.f.m. primary air fan driven by a 150-hp. Shunt commutator-type a.c. motor. This motor has a variable speed range within 1000-500 r.p.m. and is cooled by a 3318 c.f.m. blower driven by a 5-hp. motor.

Primary air represents 25-30 percent of the total air introduced for combustion (8500 c.f.m.) and the primary air-coal temperature is maintained at 150-180 deg. F. through automatic adjustment of the cold airintake damper. It is on the pressure side of the primary air fan that dust from the stack dust collectors is introduced to be projected into the kiln by the primary air blast. Secondary air is preheated through the upper end of the clinker cooler and introduced into the kiln at about 1200 deg. F. The cooler is equipped for either manual or automatic regulation of grate speed to maintain the desired temperature of secondary air.

The kiln actually measures 401 ft. 10 in. in length, has a slope of $\frac{1}{2}$ in. to the foot and is supported on six water-cooled sets of rollers. It has its



Firing end of kiln. Note draw-off point for heated air, used for drying in coal pulverizer when kiln is first started up



Burner pipe into kiln (right) is extendable and retractable to reposition flame in burning zone

nose ring cooled by air bled from the pressure side of the clinker cooler fan. The burner pipe is of plain steel without water or air-cooling because it is of extendable and retractable constuction which makes any effective cooling arrangement difficult. Seal rings are relatively tight and clinker dust spilling from the hood falls on to the dragchain conveyor carrying the clinker from the cooler.

The kiln is driven by two balanced 100-hp. Shunt commutator motors V-belted through couplings and two sets of Falk gears to the kiln gear ring.

The setting of the brushes, to vary the speed, is changed on the kiln control panel and any given setting of brushes made for one motor energizes the second one proportionately for equal speed. The motors are rated at 400-1200 r.p.m. and permit variable speed within a range of 3:1. Kiln drive motors are cooled by 2655 c.f.m. (4 in. w.g.) fans driven by 3-hp. motors. The kiln is being driven at a normal speed of 57 seconds per revolution.

Construction of the kiln and the use of dams within the calcining zone and at the point of clinker discharge are of special interest and differ from American practice. The calcining zone is 11 ft. 6 in. diameter and 192 ft. 3½ in. in length. There is a 10-ft. length of tapered section to a 13-ft. 2-in. diameter burning zone 84 ft. 8½-in. in length. Similarly, there is a 10-ft. tapered section to a 13-ft. 2-in. diameter preheating zone measuring 104 ft. 10 in. in length. The large diameter preheating and burning zones are one of the major reasons for the large kiln production and, along with other factors, for the relatively low heat consumption per barrel of output.

The kiln is lined for its entire length with both 6-in. and 9-in. thick refractories, and with 41/2-in. abrasive-resistant brick at the back end. A special nose block is used at the firing end of the kiln followed by 10 ft. of 9-in. super-duty 70 percent alumina brick. Then follows 50 ft. of 6-in. Magnecon basic brick. Behind the hot zone, the lining is of 9-in., 70 percent alumina brick for a distance including the slope into the smaller diameter calcining zone. A 9-in. lining of super duty fireclay brick continues for a distance of 50 ft. into the calcining zone followed by 110 ft. of 9-in. 40-45 percent alumina high duty brick within the calcining zone. A 6-in. lining of the same quality brick extends 15 ft. beyond the taper into the preheating

zone and the remaining 90 ft. of kiln has 4½-in. abrasive-resistant brick.

The chain section begins 10 ft. from the back end of the kiln and, at present, extends a distance of 55 ft. Straight hanging %-in. link chain are used for a distance of 5 ft., starting 10 ft. from the end of the kiln. Then there is 30 ft. of 34-in. chain of a Garland looping, or overlapping pattern, through suspension of the ends of the separate chains from supports 45 deg. apart within the kiln shell. This gives a dense pattern which is followed with a 20-ft. section of ordinary hanging %-in. chain. Use of heavy 34-in. double-hanging chains is effective in driving the slurry through and preventing formation of mud rings, which have proved no problem since the present system was adopted.

Among reasons for such a large diameter preheating zone is to slow the gas velocity and yet allow a large volume of gases to pass, thus minimizing dusting. Also, a larger volume of chains — 50 tons in this kiln — may be used and thus there is more effective chain surface for drying slurry in a given length of kiln shell. The slurry is completely dried out when it passes the chain section, as compared to the 5-9 percent moisture at this



Take-off trailey on kiln shell for recording temperatures on control panel as indicated by thermocouple. Such readings are taken in front of chain section and in calcining zone



Dust from back end of kiln and stack dust collectors is placed in bin above this pump which transfers into a like bin on firing floor for feed into firing end of kiln



Continuous slump sampler (upper left) on level below ferriswheel feeder to kiln



These two auxiliary fons are to cool shunt commutator motors driving the kiln. Air is drawn through filter

point in many other kilns; and thus most of the total kiln length is left to be effective in further raising of the temperature, calcining and burning of the clinker while carrying a heavy loading.

Temperature of the material leaving the chains is about 1250 - 1300 deg. F. as measured by thermocouple. This reading is one of the important control points in firing. Exhaust temperature is 470 deg. F. Draft loss through the kiln is 2½ in. w.g.

Use of a high volatile coal which burns with an extremely short, intense flame was one of the reasons for the enlarged diameter burning zone. The raw materials are relatively hard burning which requires that much heat transfer be accomplished in a short length of the kiln. A dam at the outlet from the burning zone helps retain the material longer. Ash rings have a tendency to form 10 ft. inside the burning zone and, of course, their building up does not have as serious an effect in reducing clear diameter as in smaller diameter kilns.

The dam at the front of the kiln is

18-in. high as built up from the shell and is actually a 12-in. obstruction. There are three dams of 12-in. clear height spaced about equally apart in the calcining zone to slow the movement of material through that zone and thus permit more complete calcination. More of them likely will be installed. They are built up of ordinary refractory brick, using 6- and 9-in. thickness brick alternately in building a pyramid-shaped dam. At the junction of 6- and 9-in. brick lining in the kiln, a 3-in. shoulder is available to key in the brick. When they are inserted where the lining thickness is uniform, a butt plate is required for an anchor. Regular refractory mortar is used.

The kiln was shipped to the plant by rail from the manufacturers' plant in Lachine, P. Q., and it was not necessary to restrict the diameter because of right-of-way considerations. However, some of the shipping was done at night-time when traffic was low. The riding rings were the only trouble-some items and they were delivered at night on a special railroad car. The firing hood was shipped in halves.

ors of 15 t.p.h. capacity. That from the Multiclone discharges into a 14-in. screw conveyor of 20 t.p.h. capacity, which also collects the dust from the two 12-in. screw conveyors, delivering into a bucket elevator. The dust collectors and the dust housing have motorized tipping seal valves for dust release and the inlet flue has rotary valves.

Dust is screened over a 2- x 4-ft. overhead vibrating screen to remove any tramp iron and is discharged into an 80-ton dust bin with conical bottom. From this bin, a 6-in. type H Fuller pump of 25 t.p.h. capacity driven by a 40-hp, motor delivers the dust into a 60-ton cylindrical bin of conical bottom at the kiln firing floor. This bin is vented by a small stocking-type dust collector overhead, which discharges dust into the bin itself. From this bin, the dust is fed into the pipe on the pressure side of the primary air fan and blown into the kiln with the pulverized coal.

All of the dust is thus returned into the kiln and burned into clinker. It amounts to 14 percent of total clinker production (110 tons per day). For every lb. of coal fired into the kiln there is almost half as much dust in the primary air stream.

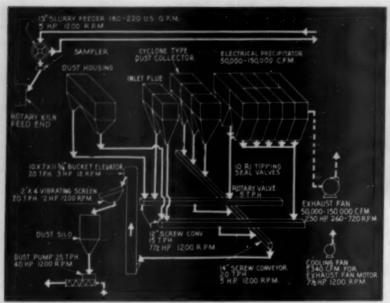
There is a tendency to burn clinker harder than ordinary in this kiln so injection of the dust into the firing zone presents no problem as far as free lime is concerned. Alkalis are being held well below 1 percent in the finished cement but might become a limiting factor if the dust load be higher. With the exception of alkalis, composition of the raw dust is about the same as for the slurry and no adjustment in the raw mix composition is needed. An estimated 4 to 10 percent is calcined. About 75 percent of the total dust is from the Multiclone and dust housing, and the balance is of the finer fraction from the electrical precipitator. The dust is quickly converted into clinker dust within the kiln.

DUST RETURNED TO FIRING ZONE

S TACK DUST is exhausted through a Multiclone cyclone dust collector followed by a Cottrell electrical precipitator on the suction side of the induced draft fan. It has two parallel compartments of rod curtain electrodes followed by pocket electrodes, and has gates at both ends so that one section may be operated while the other is out of service for repair. The exhaust fan is rated 50,000 - 150,000 c.f.m. at 7 in. w.g. It is driven by a 250-hp. shunt commutator motor with speed range of 260 - 720 r.p.m. and the motor is cooled by a 5340 c.f.m. (4 in. w.g.) fan.

Collection efficiency of the Multiclone dust collector is an estimated 75 percent and the Cottrell has an efficiency of about 99 percent. Cleaned gases are exhausted through the 400-ft. stack. Construction of the stack is of reinforced concrete, with a firebrick inner shell and air space between. It is 26 ft. outside diameter at the base, 15½ ft. inside diameter, and it measures 16½ ft. outside diameter at the top with a 12-ft. inside diameter. The concrete is 19½ in. thick at the base, 7 in. at the top and the brick lining measures 20 in. thick at the base and 8 in. at the top. Air circulates between the two shells and there are no signs of concrete cracking.

Dust from the back end of the kiln, the flue dust connection and the electrical precipitator is discharged equally into two parallel 12-in, screw convey-



Flowsheet showing handling of dust recovered from exhaust gases into dust silo to be transported to a silo on operating floor for return into kiln

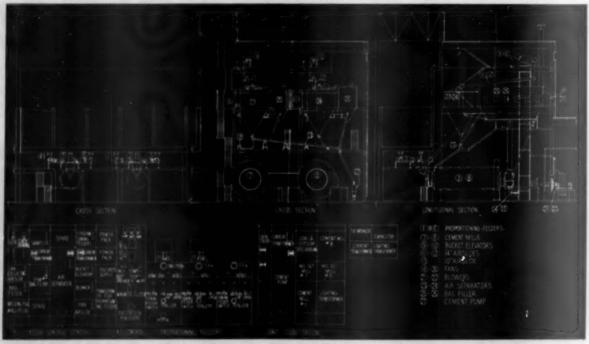
This is a feature of the operation since profitable dust recovery and/or its disposal are one of the most trouble-some problems in the cement industry. Up to 40 percent of the feed, representing 100 percent of the dust recuperated, is being reclaimed successfully in this manner in other plants of the company.

A substantial saving is realized through profitable recovery of the dust

into finished product and output of the kiln is increased as a result. And there are other benefits. Not having to mix water with the dust to make a slurry, or to add makeup water if the dust be introduced dry into the slurry, results in fuel savings. Having a highly volatile fuel that burns right up to the burner tip, the injection of dust is beneficial in extending the life of the burner pipe. The dust lengthens the flame, moving it a foot or two away from the burner pipe and extending it a distance of possibly 10 ft. into the burning zone. Increased luminosity in the burning zone undoubtedly aids heat transfer and reflects in greater efficiency from the fuel.

Production of dust is very uniform and it is up to the burner to use the quantity delivered into the dust bin on the firing floor. He must make the necessary adjustments should any surges in quantity develop. Feed of dust from the bin is introduced into the primary air pipe by two horizontal 6-in. non-flooding type screw feeders 10 ft. in length. They are driven by 3-hp, variable speed electric motor and have a capacity range of 1.5 - 15 t.p.h.

The dust bins, as well as coal mill feed bin and cement silos, are equipped with Tektor electronic level control instruments that are highly sensitive. This indicator is manufactured by the Fielden Division of Robertshaw-Fulton Controls Co. and consists of a sensing prober, or feeler, inside the bin at the desired level, which is sensitive to and undergoes change in its current-carrying capacity as material builds up around it. Thus, a relay is actuated. This instrument is an important control for the operator, and lights on the kiln panel indicate when the bin is approaching full. Similar units in the storage and packing plant are used for both high and low level indication in the silos.



Vertical sections of finish grinding departments, showing proportioning feeders and layout of two identical closed-circuit grinding arrangements. One of two motor control centers and one of two panels for proportioning controls is shown



All Buckets Take a Beating...Here's the Medicine!

We're often asked about bucket maintenance, what hard-facing material to use and how to use it for maximum wear protection. Actually, your own equipment gives you part of the answer. Each bucket wears differently, depending upon how it is used and the kind of material handled. By watching for development of wear patterns, then hard-facing these areas at definite intervals, you'll get extended service with greatest economy. Remember, a frequent touch-up is better than a major repair...more economical in hard-metal and less costly in down time.

If buckets are severely worn, first build up with Stoody Manganese. For hard-facing, the alloy most commonly used is Stoody 21, preferred because of good wear resistance, fast deposition rate and low price. Occasionally, under conditions of excessive abrasion, Coated Tube Stoodite gives longer life on shovel teeth and reduces maintenance costs.

Full particulars on alloy recommendations and hard-facing procedures are in the Stoody HARD-FACING GUIDEBOOK. Ask your dealer for a copy (check the "yellow pages" of your phone book) or write direct.



Bucket teeth (top illustration) and adapters (above) are amply coated with Stoody 21. Hard-faced teeth on this job averaged two full shifts of extra service before needing additional hard-facing treatment.



These Stoody 21 beads across the bucket resist severe abrasion as it is dragged across rubble, returning for a new bite.



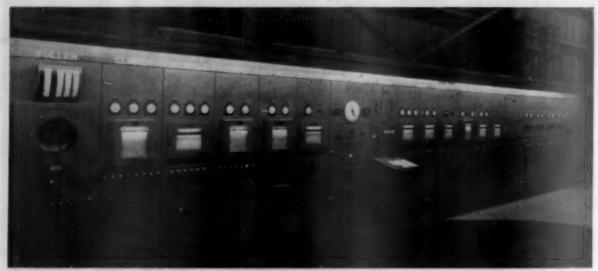
Lips on this clam shell are kept in good shape for a tight seal with Stoody 21.



Scoop lifts often lead a tough life. Here, lips, sides and bottoms are kept in good condition with Stoody 21. Occasional touch-ups are made as wear occurs.

STOODY COMPANY

11929 East Slauson Avenue, Whittier, California



Klin penel has instruments for every conceivable operation associated with kiln. Note "window" panel over operator's stand which shows light in appropriate rectangle with message when a given item of equipment is stopped. There are 30 windows which light, individually, should there be trouble with or stoppage of equipment

INSTRUMENTS—FIRING METHODS

ALL GAUGES, meters, indicators, recorders, switches, alarms and indicating lights that could possibly be visualized for rotary kiln operation are centralized on a main kiln control panel which is the most highly instrumentalized we have yet observed. It comprises instruments and controls for all operations related to firing and consists of 14 separate panels in addition to a Cottrell precipitator control panel comprising four switchboard panels.

Among recording instruments are an L & N Speedomax 6-pen recorder for temperature of the gases leaving the kiln exhaust fan, that of the primary air in the bypass, the hot air leaving the Multiclone serving the clinker cooler, that of the cooler waste air, the hot air ahead of the coal mill and the secondary air temperature leaving the clinker cooler; a Speedomax recording the primary air tem-

perature leaving the fan; a Speedomax for the primary air temperature after the coal mill; a Speedomax recording the temperature of the gases in the smoke chamber; a Minneapolis-Honneywell Regulator Co. Electronik recording the speed of the clinker cooler drive and that of the Waytrol feeding coal into the mill; a 5-pen Electronik recording the pressure of the heated air ahead of the coal mill, pressure loss across the mill, the c.f.m. of heated air entering the mill, the c.f.m. of hot air in the by-pass and the pressure in the precipitator; an Electronik recording the burning zone temperature; an Electronik recording temperature of the gases ahead of the chain section and in the calcining zone; an Electronik recording pressure of the gases in the smoke chamber; and one recording the Os and CO in the kiln exit gases measured by a Beckman gas analyzer.

Among the many other instruments are a Hays pointer gauge for indicating the draft in the clinker cooler vent stack and in the separate cooler compartments; a Reeves hand operated variable speed control for the clinker cooler grate; the electrical control panel of instruments, lights and switches for the coal Waytrol; balancing rheostats (hand-operated) to shift the motor brushes in the kiln shunt commutator drive motors; all manner of signal lights: ammeters: voltmeters: startstop switches; damper controls; interlocking selector switches; revolution and speed counters.

Among typical signal lights are those that indicate that the kiln slurry ferris-wheel feeder is functioning, those which show that the shunt commutator motor cooling fans are operating, damper position indicating lights; that for the clinker crusher oil pump and many others that show the condition of operating equipment.

(Continued on page 101)



View from above, showing enclosed conveyor-screens, closedcircuited with clinker crusher



Continuous analyzer for O, and CO at back end of kiln

Now...

from Caterpillar

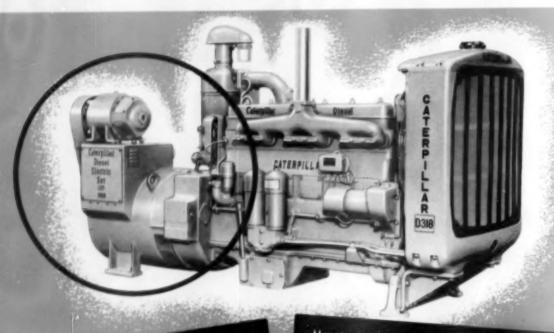
...a major

development

in

MODERN ELECTRIC POWER The new

CATERPILLAR

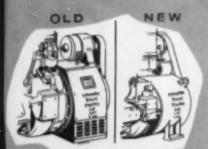


Nothing like it for simple operation, flexible application, compact power, application, long life and ease of maintenance.

Heart of the new line of Cat Diesel Electric Sets, providing in one package the best features of self-regulated and externally-regulated generator plants—you get more for your money.

Easily paralleled with other generators now in use.

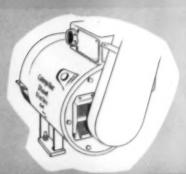
There is a big difference in size between the old and new Caterpillar Generators.



New insulation permits more compact design—exaggerated comparison in illustration below.

8 NEW

New design saves space. Leads can be taken from side, back or top without affecting machine width.



GENERATOR

Here is a new concept in generators — an advance that stems both from Caterpillar research and practical experience in the field of electric power.

Combining latest developments in design, materials and production, it brings to Caterpillar's new line of Diesel Electric Sets the efficiency of the externally-regulated set in a self-regulated set—you get more for your money.

These rugged power packages provide you with many new advantages. Here are a few of many features that add up to a new standard of efficient, economical performance:

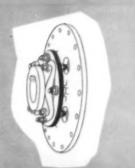
- Close regulation of voltage—no load to full load.
- Easy to start—require no operating adjustments. Anyone can run them.
- Extremely compact—big electrically, packing more power in smaller space than old style units.
- Easily paralleled with other generators now in use.
- Like all Caterpillar-built equipment— 100% backed by Caterpillar.
- Sold and serviced by one reliable source
 —your nearby Caterpillar Dealer.

Whatever your power requirements, it will pay you to look into the new Cat Diesel Electric Sets with their advance-design generators. Get the full facts about them from your Caterpillar Dealer.

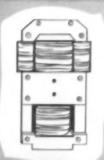
MAJOR ADVANTAGES OF THE NEW CAT GENERATORS

- MATCHED TO ENGINE PERFORMANCE. Each Cat Generator is designed and built to exactly match the Cat Engine powering it, assuring maximum efficiency in a simple, complete package.
- 2 SELF-REGULATING, WITH CLOSE VOLTAGE REGULATION. Designed to meet the needs of applications now served by self-regulated or externally-regulated generators, this new generator provides steady voltage from no load to full load.
- 3 ADJUSTABLE FOR SPECIAL CONDITIONS, During initial installation, the terminal voltage and voltage "droop" can be adjusted to meet the special conditions of the application. After that, the adjustments are locked and no further adjustments are necessary.
- 4 EASY TO INSTALL. No complicated switchgear or external voltage regulators are needed.
- 5 VERSATILE IN APPLICATION. Easily paralleled with other generators now in use.
- 6 SMALL AND COMPACT. Occupy less space than other generators. A reduction in frame size, close coupling, top-mounted exciter results in a shorter over-all package length.
- 7 BIG ELECTRICALLY. Motor starting ability capacity to handle the surge of heavy loads.
- 8 EASY TO MAINTAIN. Heavy-duty, single-bearing, close-coupled construction. The single bearing is easily accessible and is lubricated from an oil reservoir that requires filling only once a year.
- 9 RUGGEDLY CONSTRUCTED. Heavy-duty, laminated pole rotor for improved operation and increased rotor life.
- 10 DESIGNED FOR LONG LIFE. Built to match the long life of the Caterpillar Engine powering them.

Disc-type coupling and single-bearing design save space. Single bearing is easily accessible.



The "regulator" of the Caterpillar Generator. No moving parts — compact — reliable.



The control panel—adjustments locked at installation. No further attention required.

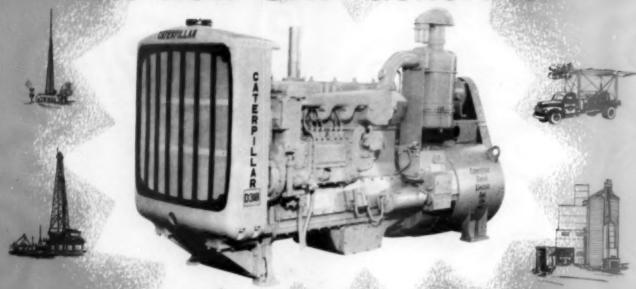








The new CAT* Generator



... another example of Caterpillar leadership in action

In 1939, Caterpillar introduced the first Cat selfregulated Electric Set.

At the time, this was a new concept in diesel-electric power.

Like most new developments, it had to win acceptance against "old, hidebound, traditional prejudices and practices."

It won acceptance — quickly and with outstanding success!

Just look at the record: since 1939, thousands of Cat Electric Sets have delivered long, reliable, economical service in widely different applications in every corner of the world. Sets with many thousands of hours of profitable operation are not uncommon. Many with more than 100,000 hours on their meters are still in use and going strong.

No matter how old they grow, not a single one ever becomes a "parts orphan." Like every Caterpillar-built machine, genuine Cat parts will be available as long as you have a need for them.

Now Caterpillar introduces another new concept in diesel-electric power—a new and better generator, heart of the new line of Caterpillar Diesel Electric Sets.

Like that 1939 "new concept of diesel-electric power," this is also backed $100\,\%$.

New design, new materials and new production techniques have made it possible for you to get more for your money in the new power packages.

See your Caterpillar Dealer about the new line today!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

MAIL TODAY!

CATERPILLAR TRACTOR CO., Poorig, Illinois, U. S. A.

I'd like more information on the new Cat Generator.

Name

Company

Address

City

one

CATERPILLAR

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NEW HEAVY-DUTY ELECTRIC SETS

One panel gives the burner a complete visual picture of the status of operating equipment. It comprises 36 rectangular windows which are blanked out when all equipment is running properly. Should any unit of equipment that has its drive tied electrically with the lights behind the various glass windows be shut off or come to a stop, a light will show and a word description of the status of the equipment can be read by the burner. Alongside, there is a schematic showing the flow from the coal mill feed bin right on through to exhaust of the kiln. The lights that indicate fullness of the dust bins are located right on the schematic of the bins.

Kiln Operation

Operation of the kiln is almost entirely without the use of automatic devices. The only automatic control in daily use is regulation of the cold air damper which is the means of holding the primary air-coal mixture temperature at 150 - 180 deg. F. The speed of the clinker cooler grate may be automatically regulated to hold the desired secondary air temperature of 1200 - 1300 deg. F.

Primary air for the drying of the coal is taken off the low-heat end of the air-quenching clinker cooler at 550 deg. F. rather than from the kiln hood for reasons of fuel savings and to minimize turbulence within the kiln hood. It is believed that use of this low level heat source, rather than drawing hotter air from within the kiln hood, contributes to a small saving in fuel.

Gas analysis is used as a guide to check on firing performance, but the burner operates the kiln to hold a desired backend draft reading, and according to temperatures in the kiln. Temperature readings in the hot zone, at the back end, in the calcining zone and where the load comes out of the chain section are all available to him on the board.

The draft measurement at the outlet of the kiln is held at 2½ in. w.g. which, under normal conditions, yields a slight draft of about .05 in. at the hood. Draft required through the Multiclone stack dust collector is 2½ in. and, for the Cottrell precipitator, is ½ in. w.g. The high stack is effective in creating a draft of 2½ in., which helps the fan, and the exhaust fan is pulling 3 in. w.g.

Normal practice is to hold the kiln speed constant at 57 seconds per revolution, except to meet unusual load conditions in the kiln, and to vary the firing rate to maintain constant burning conditions. Oxygen readings are running 2½ percent at present, which is higher than desired but due tempo-



Unit substation in mill building (slurry)

rarily to conditions affecting the coal: primary air ratio which will be corrected.

Operating under forced conditions in the interest of high output is another factor adversely affecting efficiency. Other plants of the company are firing kilns consistently with as low as 0.1 percent O_u and that is the goal for this kiln after necessary adjustments are made and experience gained.

Experience with kiln rings has been good. Mud rings have caused no trouble in the chain section but coal ash rigs tend to form about 10 ft. inside the firing hood. The burner pipe has a telescoping sleeve arrangement and, through use of a lever, it may be ex-

tended or retracted in the kiln to reposition the flame. Usual practice is to
adjust the burner pipe, when a ring
is encountered, to heat and cool the
ring off alternately and thus cause it
to drop. Firing is then done close up
to the hood short of the regular position, for maximum heat applied to
the ring, probably for a period of 6
hr., followed by projecting the flame
beyond the ring. Range of adjustment
is 12 ft. and the pipe may be rotated.

It is expected that a production of 5000 bbl. of clinker will soon be attained and that fuel consumption will be reduced from the present one million B.t.u. per bbl. to slightly over 900,000 B.t.u.

CLINKER COOLING-GRINDING

CLINKER FROM THE KILN is cooled to 150-180 deg. F. over a #744 Fuller inclined grate, air-quenching cooler. The grate is driven by a 10-hp. motor. Air forced through the grate is supplied from a fan delivering 35,-000 - 80,000 c.f.m., 9-in. w.g. It is driven by a 150-hp. shunt commutator motor with speed range of 1000 - 500 r.p.m. Cooling air is supplied this motor by a 3318 c.f.m. fan driven by a 5-hp. motor. The cooler is exhausted through a No. 80, 50,000 c.f.m. Multiclone with 60-hp. exhaust fan. Clinker dust discharges through a tipping valve to a 6-in. screw feeder delivering to the clinker conveyor.

Clinker coming off the grate is put through a Fuller integral chunk breaker driven by a 15-hp. motor and the motor and the clinker, along with clinker dust collected from all sources, is carried by a 14-in., 40-80 t.p.h., drag chain conveyor, with 15-hp. drive, to one of two bucket elevators. One is a spare. Each of the two ele-

vators delivers over a 36-in. x 17-ft. Jeffrey conveyor screen (there are two) which carries \(^{\alpha}\)-in. openings and is in closed circuit with a \(^{\alpha}636\) Allis-Chalmers Hydrocone crusher (one) of 30 t.p.h. capacity and driven by a 50-hp. motor. Oversize put through the crusher, which has a small surge hopper overhead, is recirculated over the screen via the same bucket elevator. Both circuits may be used but ordinarily only one is required. Minus \(^{\alpha}\)-in. clinker is delivered into the adjacent storage area by an 18-in. drag chain.

The clinker crushing department, including the screens which are enclosed, is vented by a 1600 c.f.m. bagtype dust collector. Dust is returned on to the 14-in. clinker drag chain conveyor.

Cement is ground through two closed-circuit grinding systems, each consisting of a 10- x 28-ft., 2-compartment mill and 16-ft. Sturtevant mechanical air separator.

Feed for the mills is supplied from



Central subicle for clinker grinding mills

a row of five feed bins of 400 tons capacity, each of which are filled by the overhead crane in the main storage area. Two bins are for clinker of %-in. top size, two for gypsum and the fifth, in the middle of the row, is for possible future use such as for limestone if mortar cement be manufactured. There are six Waytrol proportioning feeders of the same design as in the raw mill. Clinker feeders have a capacity range of 5-45 t.p.h., those for gypsum are 0 - 2 t.p.h., and the two installed for future use are 0-13 t.p.h. Two of them are electrically interlocked to feed each mill. Proportioned clinker (96 percent) and gypsum (4 percent) are fed into each mill through a feed spout.

The mills are driven at 16.8 r.p.m. by 1250-hp., 180 r.p.m. synchronous motors through magnetic clutches. They carry a ball loading of 190,000 lb., consisting of 55,000 lb. of 2½-, 3- and 3½-in. sizes in the first compartment, and 135,000 lb. of 1- and 1½-in. sizes in the finish compartment.

The mill stream in each case is transferred by a 14-in. F-H Airslide into the boot of a bucket elevator and from the head of the elevator by a second 14-in. Airslide into the air

separator. Elevators and airslides are of 220 t.p.h. capacity to permit carrying large circulating loads. Rejects are returned into the feed end of the mill. A 45 c.f.m. positive pressure blower supplies low pressure air for both airslides. Drive for the air separator is a 125-hp. motor. Cement from both separators is discharged to a single 14-in. Airslide, delivering to the hopper of a 7-in. type H2 F-K pump for transfer to the cement silos. Pump capacity and that for the airslide are 400 U. S. bbl. per hr. A 260 c.f.m. blower supplies air for the airslide and the cement pump is driven by a 150hp. motor.

A 20,000 c.f.m. bag-type dust filter vents the mill department and draws cool air through the separator, in each case, dropping the temperature of the cement from about 185 - 195 deg. F. out of the mill to 160 deg. F. Dust is returned into the outlet of the mill. Samples of cement are taken continuously from the air separator discharge spouts and are checked hourly for (Blaine) fineness.

Circulating loads in the range of 300-400 percent are carried in producing 33 t.p.h. of cement from each mill, ground to a fineness of 5-8 per-

cent retained on a 200-mesh sieve. Specifications as written by the Canadian Standards Association permit a coarser ground cement than required in the United States and fineness is measured on the 200-mesh sieve. A cement of the fineness ground in this plant corresponds to a Blaine fineness of 2750 - 2900 or 1500 - 1600 Wagner. Type II cement to be made in 1956 for the St. Lawrence Seaway will have a fineness of 3200 Blaine.

Storage - Packing

Facilities for storage and the packing of cement are of original design and different than any on this continent. The system is also new as far as Holderbank plants are concerned. The silos are superimposed over the packing stations and loading points so that, once the cement is placed into storage, handling is completely by gravity.

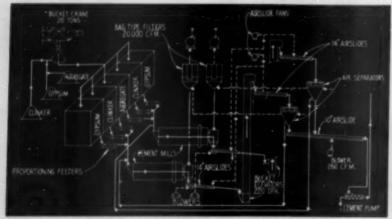
There are 12 silos in two rows of six and they are arranged in three groups of four, each with its separate packing station below, which is of higher elevation than the loading level for trucks and railroad cars. Each silo has a capacity of 6900 bbl., and they are filled from five 3-way and one 2-way valves in the main line from the cement pump in the finish mill.

They are of reinforced concrete construction, of 37-ft. outside diameter with 12-in, thick outer walls and have conical-hoppered steel bottoms sloped at 45 deg. Height of the silos is 42 ft. and clearance is 39 ft. above the ground. Each pair of opposite silos is supported by a common rectangular reinforced concrete column between, 4- x 9-ft. in cross-section, and by two 3-ft. 6-in. circular reinforced concrete columns on opposite sides of each silo. The shells are designed as structural beams. The overhead superstructure is supported on 2-ft. circular reinforced concrete columns.

Each group of four silos has one packing station centrally located, which may draw its supply from any of the four silos. On the one side, the six silos are also arranged for bulk loading into railroad cars. Opposite, the six silos may load into bulk cement trucks.

Within the hoppered bottoms there are four open top-type airslides running up the slope and spaced 90 deg. apart. Air supplied to these airslides, to aeration pads and to 8-in. F-H airfeeders at the truncated bottoms of the cones provides the required agitation and fluidity for uninterrupted flow-out of cement.

Bulk railroad cars are loaded by a 10-in. airslide from any of six silos, delivering to spouts at a rate up to 600 t.p.h. A similar arrangement was



Flow diagram of closed-circuit, single-stage grinding systems for clinker. Two middle proportioning feeders not in use for grinding standard portland cement

KENNEDY UNI-FORM CARRIER ROLLS CUT OPERATING AND MAINTENANCE COSTS and they improve operation too!

NEW, ONE PIECE, STEEL CARRIER ROLLS ADD 50% GREATER STRENGTH TO TROUGHING AND RETURN CONVEYOR BELTS

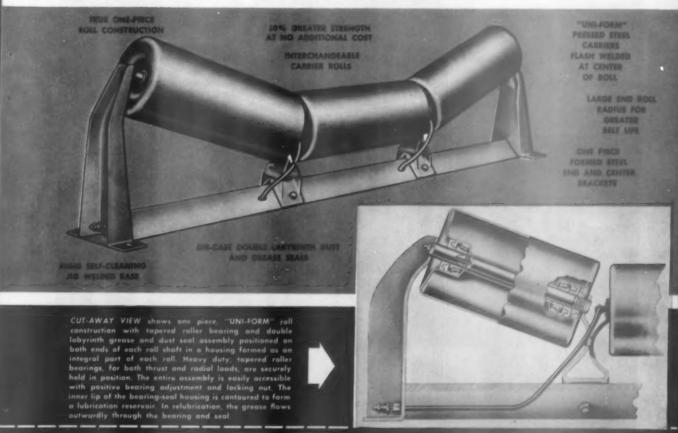
Deep drawn steel tubular rollers of 5" and 6" diameter, uniform in weight, thickness and balance, pressed from hot rolled plate to form a smooth, carrying surface. Roll ends contoured to eliminate belt pinching and provide longer belt life.

Both ends of rolls equipped with double labyrinth grease fingers, dust seals and anti-friction type tapered roller bearings. Steel through shafts extend throughout length of each roll. Carrier Rolls mounted as a unit with two outer rolls set at 20° angle to center roll. Each Idler unit mounted on rugged steel support at inverted angle which prevents material from fouling rollers.

UNI-FORM Carrier Rolls are available as stationary or portable, complete units or prefabricated sections.

Let Kennedy engineers show you how the economy and efficiency of UNI-FORM troughing and return Idlers can be applied to your bulk materials handling problem.

Send for Bulletin, D-1002, describing these new, super-strength one-piece carrier rolls for bulk material handling.



KENNEDY-VAN SAUN

Manufacturing and Engineering Corporation - Two Park Avenue, New York 16, N. Y. - Factory: Banville, Pa.



Showing how four Airslides converge from a group of four cement siles to centralized packing station



Cement from two mechanical air separators discharges into a common Airslide for delivery to cement pump. There are continuous samplers at each point of transfer to the Airslide

provided for loading trucks from the six silos on the opposite side. These airslides are equipped with cut-off gates.

Each group of four silos also has airslides delivering to a 10-ton surge bin over a 4-spout St. Regis packing machine. The hopper immediately over the packer is filled through a rotary feeder and has high and low Bin-dicators for maintenance of a constant head of material.

Sacked cement is dropped on to a 30-in. reversible wire-mesh belt conveyor which transfers to a 30-in. extendable belt conveyor for either truck or track loading. This belt conveyor has starting buttons on its discharge

end for convenience, where the men loading trucks may extend or retract the conveyor.

Each packing station is vented by a 6100 c.f.m. bag filter and the dust is conveyed by 9-in. screw conveyor into a hopper under the wire mesh conveyor which also receives the spillage. A 4-in. F-K pump driven by a 15-hp. motor and supplied compressed air from a 156 c.f.m. single-stage Fuller air compressor transfers this dust back into any of the plant's four supply silos.

Multiwall paper bags are received on pallets in railroad cars and are raised by hoist to overhead storage through an opening in the floor of this superstructure. Similarly, they are lowered as desired to the packer level.

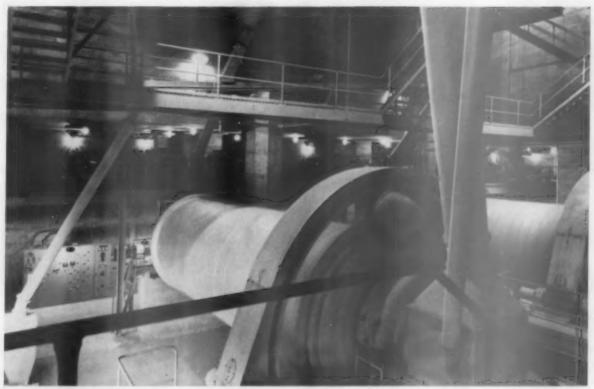
Packing capacity is 3500 bags per hr. (87½ lb.), sufficient to load fifteen 10-ton trucks per hour. Bulk loading is 300 t.p.h.

This is a flexible arrangement that permits bulk loading of both railroad cars and cement trucks, and sacked cement into cars or trucks at widely separated points.

Normal practice is to load both bulk cement and bagged cement into trucks on the day shift and to load bagged cement into cars on the night shift. Bulk cement may be loaded in cars either night or day. A foreman is in charge of the loading and packing,



Two mills in foreground are grinding slurry in open circuit. Proportioning feeders are seen in right background. On left are two clinker grinding mills



Clinker grinding mills are in closed-circuit with mechanical air separators. Cement is discharged from both air separators to a single Airslide (background) delivering to a cement pump

and each group of four silos is an independent operation complete with its own electrical control panel.

Total storage capacity is 82,800 bbl. of cement which may be considered relatively modest for a plant of this capacity in a location where the winters are long and severe. However, only one type of cement is being produced and the holding of test silos is not required.

Whether or not this design of storage and packing plant would be applicable where much greater storage is needed, it has worked out well and resulted in considerable economy at

this plant. Comparative estimates have indicated a saving of 25 percent in the outlay for structure and equipment as compared to conventional designs, the difference being largely in outlay for equipment.

There are no screw conveyors nor bucket elevators required and the problem of contamination from bolts, etc., has been eliminated. Operating costs are favorable since there are no men required to operate feeders in the release of cement into screw conveyors or other equipment. Maintenance costs will be at a minimum by virtue of having little mechanical handling

equipment. The structure is imposing and gives the impression of efficiency. Siding will be installed later for winter protection.

An estimated 35 - 40 percent of production currently is shipped in bulk and the trend is up. About half of the total cement shipped is by truck, including bagged cement delivered to docks in Quebec for water shipment.

Compressors

Compressed air is supplied by two 2-stage, water-cooled double acting Ingersoll-Rand air compressors of 564

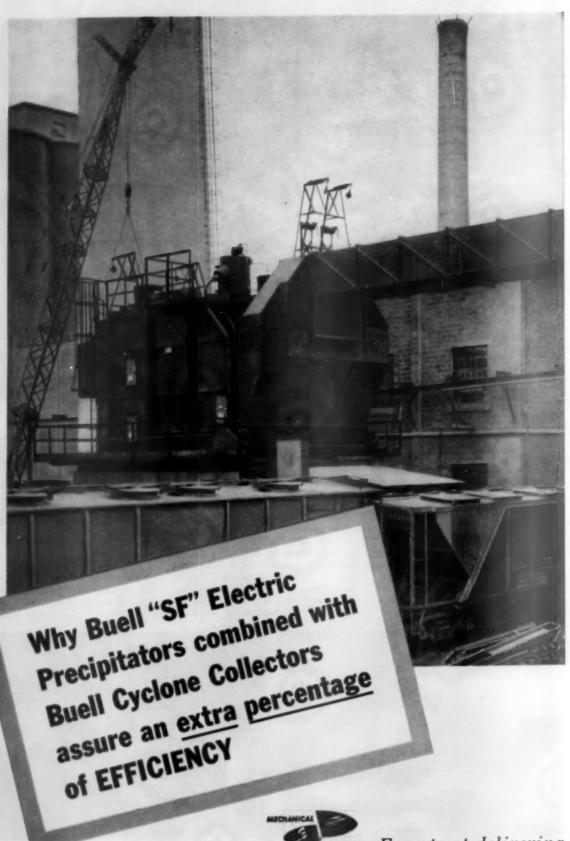
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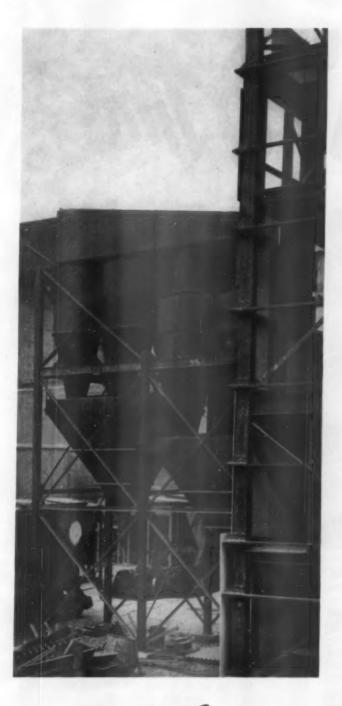
Socked cement is loaded into truck, using extendable belt conveyor



Bulk cement being loaded into truck on other side of pillars







When Buell "SF" Electric Precipitators and Buell Cyclone Collectors are installed in tandem ... you have the ultimate in efficiency under all conditions. Because their basic principles of operation are different, they complement each other in such a manner as to provide two important advantages: (1) increased efficiency, and (2), improved stability. For example, changes in the characteristics of dust particles or gases will not appreciably affect the percentage of efficiency of the combined units.

Buell "SF" Electric Precipitators with their exclusive "Spiralectrodes" are unequaled in the recovery of fine dust particles. Featuring continuous rapping and many other exclusive design advantages, they are your guarantee of that all-important extra percentage of efficiency—often the difference between a highly profitable recovery operation and a break-even one.

Buell Cyclone Collectors with their large diameter, clog-proof design, also offer you the kind of efficiency that results in many extra tons of recovered valuable dust. Whereas the secondary air currents in most collectors tend to lower efficiency, Buell's exclusive shave-off design utilizes them to recover more dust.

For detailed information on how Buell equipment is delivering that all-important extra percentage of efficiency in the cement and lime industry, write Dept. H-17, Buell Engineering Company, 70 Pine Street, New York 5, New York.

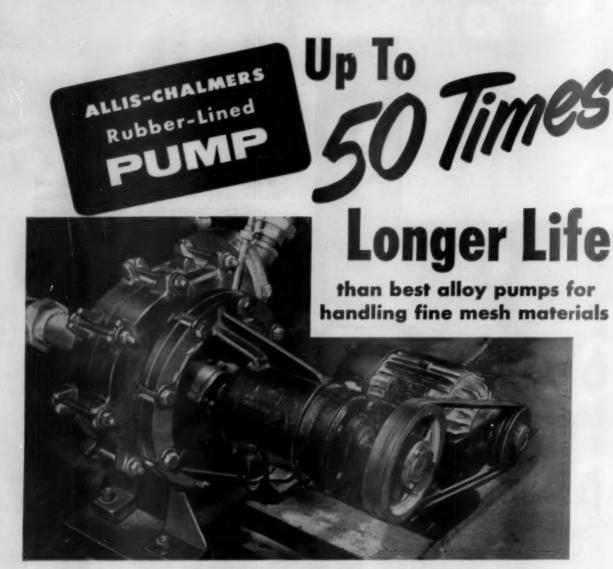
Free Booklet

Describes all three

Buell Systems for the recovery
of valuable dusts.



Extra Efficiency in DUST RECOVERY SYSTEMS



Performance records from twenty years of handling all types of slimes, slurries and other fine mesh abrasive suspensions show definite savings from the use of Allis-Chalmers Rubber-Lined Pumps. Instances of 10 to 50 times the life of the finest alloy pumps built for this service are common. Not only are pumping costs reduced, but production lost from shutdowns is almost eliminated and standbys often can be done away with.

Unique Lining Method

One secret of this amazing record is the rubber lining of the Allis-Chalmers pump. It is bonded to a heavy steel skeleton which is simply fitted into the casing. The lining and the casing are not bonded together. When the lining finally must be

renewed, the pump need not be removed from its location. Replacement cost is kept to a minimum.

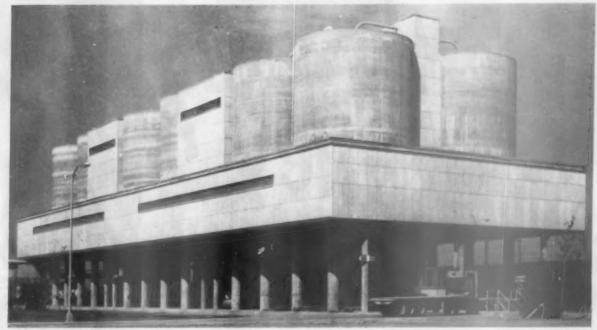
Each Installation Specially Engineered

Every pump is individually engineered to provide the best possible performance for the application involved. Special rubber linings of various compounds are available to handle a variety of slurries at low per-gallon pumping cost. Allis-Chalmers can furnish a complete coordinated pumping unit — pump, motor, control and drive — ready to install and run.

If you are handling sand, taconite, grinding mill discharge, tailings or any other abrasive slime or slurry, ask your Allis-Chalmers representative to show you how you can get long pump life and low cost per gallon pumped. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, and ask for Bulletin 52B8156.



ALLIS-CHALMERS



Close-up of cement storage and packing plant. Flow is by gravity once silos are filled by cement pump. Equipped for simultaneous loading of sacks and bulk, and for either truck or rail shipment

c.f.m. capacity each at 100 p.s.i.; a C300 Fuller single-stage rotary compressor; and two C150 Fuller singlestage rotary compressors. These units supply compressed air for the dust pump, slurry basins, cement pump and for other plant requirements. They are located inside the finish mill building.

ELECTRICAL SYSTEM—LABORATORY

APPROXIMATELY TEN PERCENT of the cost of the entire plant was for electrical apparatus and wiring, including transformers, motors, instruments, unit load and motor control stations, switchgear, etc. Electrical power is purchased from the Quebec Power and Light Co. and is brought in at 60,000 volts to the main transformers on the property.

Voltage is stepped down to 6600 for

the large synchronous motors driving the raw and finish mills, and reduction is to 550 volts at the separate unit load stations, for power supply to the balance of the motors. The high voltage provided for the larger motors is in anticipation of plant enlargement, in which event power supply would be simplified and there would be no need for tie breakers.

Majority of the motors throughout

the plant are of squirrel-cage type and most of the smaller ones are operated at 1200 r.p.m. There are six transformers and five unit substations with corresponding motor control centers. Two of the transformers are in the kiln department and the other in the mill building, the crushing plant and in the packing house.

Peak demand for the entire plant is 5100 kw. and the power requirement per ton of cement manufactured is 120 kw.h. It is expected that the power required will be reduced to 105 - 110 kw.h. per ton, or less than 19 kw.h. per bbl. About half the requirement is for crushing and grinding.

(Continued on page 112)



One of three 4-spout packing mechines. Each is supplied cement

Boot loading in Quebec City herbor. This shipment of sacked cement went to a United States port



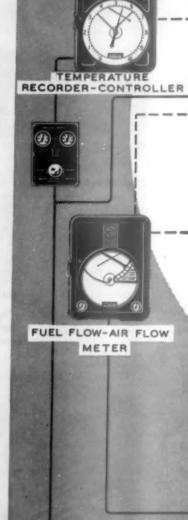
Now! operation"Self-Serve Operation"Self-Serve OperationBailey Meter Bailey

Your "Self-Serve" Bailey controlled rotary kiln literally thinks for itself and reacts quickly and correctly to any changes in operating conditions. You get:

- 4. Economical Operation—Gives maximum production from every unit of fuel you burn because Bailey Combustion Control closely guards Fuel-Air Ratio, Hood Draft, Fuel Feed, Clinker Cooling and Temperature of Air for Combustion.
- 2. Uniform High Quality of Product—Accurate measurement and control of Kiln Speed, Burning Zone Temperature, Combustibles Content and Oxygen Content . . . for a high grade product, consistently.
- 3. Minimum Maintenance—Uniform excess air conditions and constant temperatures prolong the life of your kiln. Costly refractory repairs and wear and tear on auxiliary equipment are reduced to a minimum.

The accompanying diagram shows one way in which Bailey instruments and controls can give you a "Self-Serve" Kiln. Other arrangements to suit the requirements of any rotary kiln are available.

Bailey Meter Company maintains a staff of engineers who are experts in the control of rotary kilns. Let one of these men help plan a control system to give you a "Self-Serve" rotary kiln.



P-23

Kiln Control HOOD DRAFT RECORDER (1) (1) RADIATION THERMOCOUPLE FUEL FLOW FUEL FLOW AIR FLOW ORIFICE To learn more about Bailey Rotary Kiln Control Systems, write to Bailey Meter Company at the address shown below. Ask for complete details of operation of the Rotary Kiln OUTLET Control System illustrated in this diagram. DAMPER DRIVE F.D. DAMPER O, RECORDER - CONTROLLER DRIVE

Meters and Control Systems for Process Plants

1039 IVANHOE ROAD . CLEVELAND 10, OHIO

Bailey Meter Company Limited · Montreal



Close-up of primary air fan showing 150-hp, variable speed a-c motor drive

Air blast circuit breakers are used in preference to oil-type for all transformers, and non-inflammable coolants are provided for cooling the transformers. Transformers are equipped with overload protection as well as oil gas protection which will sound an alarm and cut out the transformer should a defect develop affecting two or more windings. Alarms will sound also should overloads be imposed on the transformers. Aluminum sheathing rather than lead is used for electrical cable protection. It saves 50 percent on weight and, since it is more rigid than lead, suspension is only needed at 6-ft. intervals.

For reasons of power load, the present schedule is for one slurry grinding mill to be on a 24-hr. schedule, with the second mill running from 5 p.m.-7 a.m. when the crushing plant is down. Crushing is on a schedule of one-shift operation five days a week. Finish mills operate on an aroundthe-clock schedule.

Shunt commutator motors driving the kilns, the kiln induced draft fan and the primary and secondary air fans are a development of Brown, Boveri & Co., Ltd., Baden, Switzer-land. They operate from 3-phase alternating current power supply and provide variable speed comparable to direct-current motor without the need for a motor-generator installation or other rectifying equipment. This type of motor is widely used in Europe for variable speed applications in steel mills, paper mills, mines and other industries.

It is a rotor-fed shunt commutator motor, of shunt characteristics, which provides easy speed regulation by simple brush displacement. The secondary winding is on the stator while the primary winding is on the rotor. There is an auxiliary winding (also on the rotor) designed as a d.c. winding and which has a commutator. Two brush rockers, which may be mutually displaced, tap a polyphase, adjustable voltage from the commutator which is led to the stator secondary winding, the latter being designed with open

If the two corresponding brushes of each phase of secondary winding are on the same commutator segment, the motor runs like an ordinary induction motor, at near synchronous speed. Should the two brushes of each phase be displaced at about the same speed away from each other, a voltage is created between the corresponding brushes which increases with the brush displacement and which is imposed on the secondary winding. This causes a change of speed of the motor from the synchronous speed, that is proportional to the voltage across the brushes.

When the range of speed regulation for which the motors are designed is sufficient, 1:2 or 1:3, they can be started without auxiliary apparatus. All that is required is to bring the brush rockers to the position which corresponds to the lowest speed, by a handwheel, or automatically by a brushshifting motor. The motor may then be connected directly with the power supply.

Speed regulation is by brush displacement, by a handwheel or a brushshifting motor for any desired speed within the speed regulation range. These motors are capable of carrying heavy overloads. Should the load be such that the motor speed exceeds the no-load speed for a set brush position. it operates as a generator, feeding back to the supply position. Any desired speed within the regulation range, which is 3:1 for installations in this plant, may be set accurately and main-

In the case of the dual drive with two of these motors on the kiln, displacement of the brushes is tied electrically so that the motor speeds synchronize with change.

Characteristics of the motors require that they be cooled and, in each case, an auxiliary fan and motor is required to supply cooling air.

Another interesting electrical feature is use of a Ward-Leonard d.c. drive on the overhead storage crane, providing infinite, stepless speed range with sensitive control because of its variable voltage and separate excitation con-

motor is 250 hp., 500 volts, 1770 r.p.m. Four 50 kw., 400-volt, 1800 r.p.m. generators supply the separate motors including a 35-hp. hold motor. 35-hp. close motor and 35-hp. bridge

The main alternating current drive (Continued on page 114)



Airslides transfer cement from any sila in group of four to packing station or for bulk loading into cars or trucks

AIR AT WORK

New two-stage <u>Ro-Flo</u> compressor provides constant efficiency...cuts maintenance

Efficiency and air supply are constant year after year with Ro-Flo compressors. Even if wear occurs, it is automatically compensated for, so that air supply is unaffected.

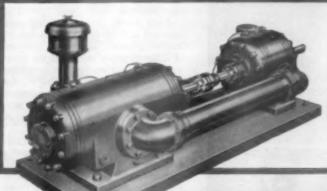
In addition, rotary design eliminates practically all vibration. No heavy foundations are needed.

Maintenance is cut too! There is no wear and tear from shock and vibration . . . no hard-to-maintain pistons and valves.

For constant efficiency . . . overall savings on air, modernize air supply with two-stage Ro-Flo compressors.

GET THE FACTS: Contact your A-C office or write Allis-Chalmers, Milwaukee 1, Wis.

Ro-Flo is on Allis-Chalmers trademark



Two-stage Ro-Flo compressors in pressures from 60 to 125 pounds gauge, and volumes from 250 to 1800 cubic feet per minute. Singlestage units for lower pressures.



. . .

ALLIS-CHALMERS



Jean Leneuville, chemical engineer, is using the flame photometer apparatus

motor. These are 230-volt motors turning at 575 r.p.m. The trolley motor is 15-hp., 230-volt and 725 r.p.m. The generator for the trolley is 25 kw., 400-volt and 1800 r.p.m. Excitation is by a 7.5 kw. generator.

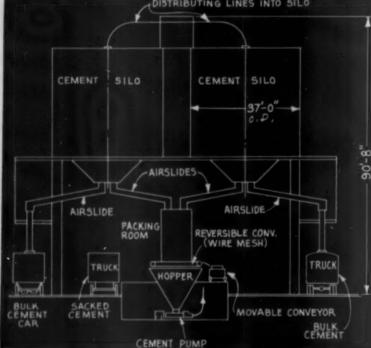
This drive provides the smoothness of direct-current operation, is speedy and likely will be low in maintenance. It eliminates the inertia effect characteristic of large a.c. motors and there is improved control of speed and point of stoppage. Snapping of cables has been avoided due to the smooth torque characteristics.

The laboratory is conveniently lo-

cated in the grinding mill building and is completely equipped with the latest in apparatus for making all required anaylses and control tests. It has the equipment for scientific study of many of the problems that con-front all portland cement manufacturers.

Four departments comprise the laband pulverizer, and an Abbé ball mill.

oratory including sample preparation, physical, balance and chemical. Equipment for sample preparation includes a Ro-tap and a Cenco sieve shaker. a Sturtevant laboratory jaw crusher Physical testing apparatus and ma-DISTRIBUTING LINES INTO SILO



Elevation of one of three groups of four siles showing arrangement for loading bulk cement into railroad cars or trucks, and also for sacked cement

chinery were specified with a view to the conduct of tests required by both the Canadian Standards Association and A.S.T.M. Cement fineness, for example, is determined by sieve analysis as required by the C.S.A. and by the Blaine air permeability apparatus.

In addition to standard chemical laboratory apparatus, a Beckman Model DU flame photometer is used for the determination of alkalis in the cement and in the dust fed the kiln. The photometer is also used for MgO determinations in the raw materials and for special analytical purposes such as the correlation of differing kiln firing conditions with properties of the finished product. Determinations of calcium and magnesia in limestone and shale samples is by use of the complexometric method.

Other equipment comprises a Beckman Model H-2 pH meter and water testing apparatus; a Brookfield Synchro - Lectric viscometer; and two Gram-atic (Swiss) analytical balances mounted on a vibration-less table. A moist cabinet, designed by the company, for moist air and water storage of cement specimens complies with A.S.T.M. requirements.

Particular attention is given the checking of the quality of slurry and its uniformity. Samples taken by the continuous samplers at the discharge ends of the raw mills and at the kiln feeder are subjected to hourly chemical tests. These samples are also checked for viscosity, and for sedi-mentation and mixing characteristics in the slurry basins. Cement fineness is checked hourly by Blaine apparatus from samples taken by continuous screw samplers at the discharge from the mechanical air separators.

Since all the recuperated dust from the kiln exhaust gases, including that from the electrical precipitator, is reintroduced into the kiln it is necessary to keep close check on the chemical composition of the dust in the various size fractions.

Aside from routine physical and chemical tests of mill samples and of finished product, samples of cements of different types are tested for comparative properties and to determine their behavior under various storage conditions and exposure conditions. Crushing, grinding and screening tests are used for determinations of sizes and grindability.

Basic layout of the plant and direction of design were under supervision of company engineers, and Anglin-Norcross of Montreal was general contractor for construction. Surveyor, Nenniger and Chenevert of Montreal and Marc Gilbert of Quebec did the

(Continued on page 118)



OF POWER

Soldier Field . Chicago, Illinois August 31st through Sept. 25th

POWERAMA — biggest show of its kind ever presented — will portray the importance of diesel and gas turbine power to our industrial economy. There'll be entertainment and interesting exhibits for everyone . . . big stage shows, displays and working exhibits including a U. S. submarine, marine craft, a saw mill, cotton gin, oil drilling rig, Army tanks, diesel locomotive and a completely new high speed train, airplanes, "dream cars," and huge earth moving equipment.

Euclid will demonstrate its complete line of diesel powered equipment. The new TC-12 Twin Crawler Tractor with a total of 388 h.p., rear-dump and bottom-dump hauling units of 10 to 50-ton capacity, and several new scrapers will dramatize the use of diesel power in mining and construction.

Plan to visit this interesting exposition - we hope to see you there!

OF POWER

ENERAL MOTORS CORP. . Cleveland 17, Ohio EUCLID DIVISION

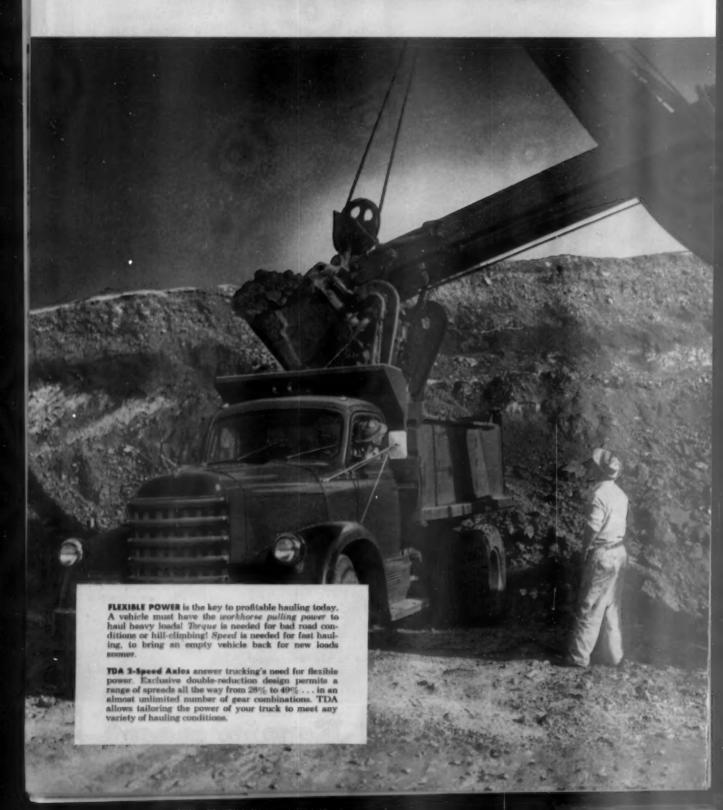


EARTH, FOR MOVING ROCK. COAL



MOTORS

TAILORED POWER



COMES TO TRUCKING

with TDA 2-speed axles

Exclusive, double-reduction design offers almost unlimited possibilities of gear ratios and ratio spreads—this versatility provides tailored power for every trucking need.

How TDA's extra "spread" works to your benefit. All 2-speed axles employ an extra set of gears to give two ranges of speed or power to choose from ... one for pulling power, the other for fast speed. Most 2-speed axles offer only one choice of "spread"—37%. Design limitations prevent changing this standard "spread".

However, TDA uses the exclusive double-reduction design. With TDA, spreads are available all the way from 28% to 49%. This means that your axle can actually be tailored to give you just the power you need. Not only can you specify the spread most suited to your immediate trucking need — but you can easily change from one spread to another by merely changing the low speed helical pinion and gear — an easy mechanical change.

TDA's more efficient use of engine power gives important benefits . . . high road speeds, faster deliveries, better payload, and maximum fuel economy. No matter what your hauling problem or load/road conditions you save with TDA.

How TDA's 2-Speed principle works! A husky hypoid ring gear and pinion set (No. 1 above) provide the first step of the total gear reduction for both fast and slow ratios. Two large, heavy-duty helical gear sets provide the second



step. Both sets are of balanced size and capacity. One set (No. 2) is for fast speed; the other (No. 3) is for slow speed. The clutch collar (No. 4) power shifts to right or left to engage one helical pinion or the other.

Greater endurance, longer truck life with TDA: TDA's simple design eliminates small complicated parts and midget size gears. Large hypoid-helical design provides more teeth in contact—quieter operation

and far less strain. Bearings are larger, too, All this adds up to more profitable operation under all conditions.



World's Largest Manufacturors of Axles for Trucks, Buses and Trailors

Plants at: Detroit, Michigan • Oshkosh, Wicconsin • Utica, New York • Ashtabula, Kanton and Newark, Ohio New Castle, Panasylvania

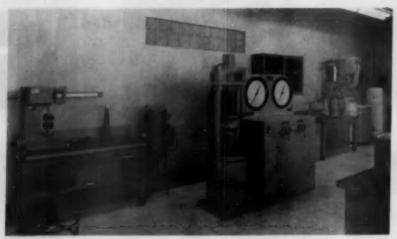
@1955 RS&A Company

Increase axle life with
GENUINE TDA EQUIPMENT

Take no chances with ordinary replacement parts. Far sure, dependable, factory-type jobs, specify genuine Timken-Detroit Axle parts kits—identical to your axles' original equipment.

Each kit is complete—gives you everything you need in one handy package. Gaskets and shims, brake liners and rivets, steering knuckles, king pins and bushings, differential nests—for every

size of brake and axle. Order by number from your dealer. Cut labor and adjustment costs. Get trucks back on the road quicker.



Lebaretery view shows machine for tension testing, autoclave and compression machine

detail engineering. Among other participating firms were the following:

edard & Girard, Ltd.
mlauriers Fila, Ltd.
mlauriers Fila, Ltd.
td.
minus Fridge Co., Ltd.
natern Canada Steel & Iron Works, Ltd.
nanc Verrault, Ltd.
omo Construction, Ltd.
omo Construction, Ltd.
agioire Cauchen, Ltd.
leband & Simard, Inc. ichand & Simard, Inc.
covincial Engineering Co., Ltd.
ebec Ready Mix, Inc.
Fleard & File, Inc.
shee Ltee
Larue, Ltd.
nerete Column Clamps, Ltd. crete Column Clamps, Ltd. nont and Dumont, Engrg. adian Kellogg Co., Ltd.

Officers - Personnel

General headquarters of St. Lawrence Cement Co. are centered in a beautiful new office building at the plant, which was built along with a well-equipped machine shop in advance of the plant construction.

General manager B. Ulrich, who has had world-wide experience with the Holderbank Co., organized the entire staff of St. Lawrence Cement Co. and was responsible for plant construction. His headquarters are at Villeneuve. P. Chapdelaine is secretarytreasurer and J. Longy is sales manager. D. M. Lewis is assistant to the

general manager.

George Zulauf, a Swiss from Holderbank, is production manager and Herbert Egger and Hans Ruegger are assistant superintendents. Mr. Ruegger will remain to assist Mr. Zulauf. Dr. Alfred Schneider is chief chemist and Jean Laneuville, chemical engineer, is assistant chief chemist. Dr. Schneider has served Holderbank in South Africa, the Belgian Congo, Belgium, The Netherlands, Brazil and in Switzerland. He has trained the local laboratory and operating staff in cement chemistry and plant control. Jan Simons is maintenance superintendent, and Claude Cantin is purchasing agent.

Chief executive officer of the company is chairman of the board, H. Gygi, who also heads the Holderbank

Co. and has his headquarters in Zurich, Switzerland. R. Koch of Luterbach, Switzerland, is president of the company.

Among European engineers who came to Quebec for construction of the plant and to instruct personnel were John Hiltemann (construction), George Schwander (kiln department), Martin Peeters (mechanical design), Edmondo Giannini (crushing, grinding), and Hans Frymann (electrical).

Since all the local employes lacked experience in cement manufacture and because it was desired to show each individual how he or she fits into overall operations, the company gave a 10-week course in cement manufacture. It was on a voluntary basis and included the office staff, for a 11/2-hr. class each week at the plant. Lectures given by the engineer specialists and company executives were combined with visits to the various departments. At the end of the course, non-compulsory examinations were given and the grades indicated the course to be successful, in helping workers to do their jobs better and making them feel they are a part of the company.

Good use was made of a 11-in.



Looding sacked cement on to truck by means of extendable belt conveyor which is moved by push button controls at discharge end

to the foot scale model of the plant which is now on display in the office lobby to help orient those interested.

Conclusion

Since production started, the plant has operated at peak capacity in helping supply the demand for cement principally in the Province of Quebec. Canada had passed from an exporting to an importing position on cement since World War II and imports had grown to a proportion of 2,400,000 bbl. annually when the decision was made to build the plant. Half of the national shortage was concentrated in

Recently, considerable cement has been shipped from the plant to United States, into upper New York State and into Detroit, Mich., Cleveland, Ohio, and other Great Lakes ports. These shipments require some five days via the St. Lawrence River, the Welland Canal and Lakes Ontario and Erie. Thusfar these exports have been of sacked cement but bulk-loading facilities are now being established in Quebec City. Bulk cement trucks will deliver to the dock.

In 1956, one-third of shipments are destined for rail shipment on the St. Lawrence Seaway project and, in 1957, the project will be of type II cement which will require addition of a third clinker-grinding mill, a second cement pump and pipeline and the addition of one percent pyrite to the raw mix.

In conclusion, we express our thanks to Mr. Ulrich and operating executives of the company for their courteous reception and complete cooperation when we inspected the plant. We also are grateful to chief chemist Dr. Alfred Schneider and the engineers who gave so freely of their time even though they were still under pressure to achieve their goal of peak operating. conditions in the plant.

Increase Cement Capacity

DIAMOND ALKALI Co., Cleveland, Ohio, has announced plans to increase the annual capacity at its Painesville, Ohio, portland cement plant by 320,-000 bbl. The project is expected to cost approximately \$1,000,000, and calls for installation of a finished cement grinding mill with auxiliary equipment.

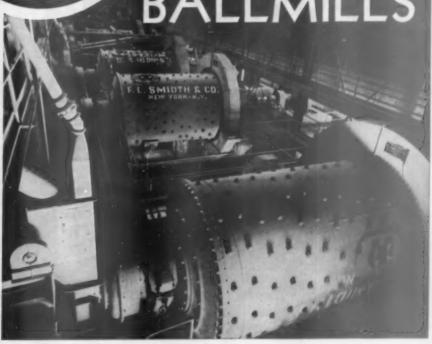
Buys Gravel Company

TROUTDALE SAND AND GRAVEL CO., Troutdale, Ore., has been purchased by Alfred R. Frey and Dallas W. Brown from Mr. and Mrs. Richard Knarr, the former owners. Alfred R. Frey is also the principal owner of Troutdale Lumber and Hardware Co.



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GENERAL MOTORS POWERAMA

Gala Celebration of the 100 Millionth GM Diesel

LAKE SHORE SOUTH, CHICAGO-AUG. 31ST THROUGH SEPT. 25TH



GM Powerama presents—"roads a-building" exhibit of GM Diesel-powered equipment for both concrete and asphalt highway construction—dump trucks, concrete paver, rock crusher, graders, rollers and scrapers.

Make your plans now! The General Motors Powerama will be a national event too important, too spectacular to miss.

On 20 acres of grounds, a World's Fair of Power will unfold wonders galore. Fascinating exhibits—thrilling demonstrations—a colorful stage show—everything to make your visit interesting, educational and well worth the trip.

Come and bring the family. Admission free!

Plus many other interesting exhibits you won't want to miss-

ALLISON TURBO-JET and TURBO-PROP engines that power America's finest, fastest fighters and transports.

CLEVELAND DIESEL engines powering a submarine you can go aboard and inspect.

ELECTRO-MOTIVE's advanced lightweight 100-mile-an-hour

train with its amazing new airsuspension springing.

EUCLID's full line of 10- to 50ton Diesel trucks and 7-to 18-yd. scrapers.

FABRICAST's exhibit of modern casting methods.

GMC Diesel trucks and coaches, SceniCruiser and spectacular new "L'Universelle."

And a Complete Exhibition of GM's 7 Dazzling Dream Cars: CHEVROLET BISCAYNE • PONTIAC STRATO STAR • OLDSMOSILE "88" DELTA • BUICK WILDCAT III • CADILLAC ELDORADO BROUGHAM LA SALLE II SEDAN • LA SALLE II SPORTS CAR



DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN In Canada: General Motors Diesel, Ltd., London, Ontario



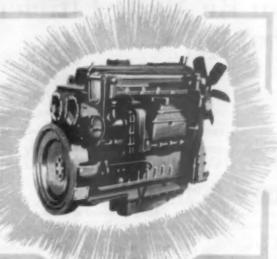
GM Powerama presents—"More Power To You" a mammoth variety show in which Diesel-powered vehicles perform fantastic maneuvers—with Big Top circus acts and a huge cast of dazzling dancing starlets.



GM Powerama presents—a wide variety of interesting, operating exhibits showing the use of Diesel power in many fields including a sawmill, a cotton gin, an irrigation system, a farm tractor and a feed mill.

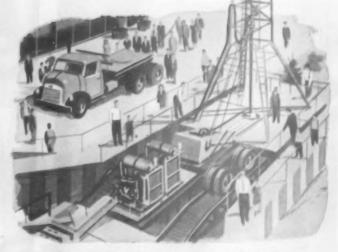
Horsepower

GM Powerama presents—at the head of the parade—Detroit Diesel's golden "6-71" Diesel engine (representing 100 Millionth General Motors Diesel H.P.). Also, Dr. Diesel's first engine and exhibits ranging from the 1933 World's Fair Diesel engine to the compact new "51" engine that opens new fields for Diesel usefulness.





GM Powerama presents—a marine display including GM Diesel-powered shrimp boat and 36-foot and 22-foot pleasure craft for the interest of those who want Diesel safety, speed and economy in their boats.



GM Powerama presents—a modern, portable oil-well drilling rig in action, powered by General Motors 2-cycle Diesel engines which have won a reputation for "more power in less space with less weight."



Overall view of vertical shaft cement kiln plant which has very compact layout

Cement Can Be Made Efficiently In A SHAFT KILN

By DR. STEVEN GOTTLIEB*

 Gippsland Industries, Inc., Traralgon, Victoria, Australia, uses air-swept mill for raw grinding material, having up to 15 percent moisture content, which dries while it grinds. Kiln feed is nodulized with sizes being easily regulated

PRODUCTION OF CEMENT in a modern vertical kiln, a process new to Australia, was started by Gippsland Industries, Inc., at Traralgon, Victoria, in 1954. After more than a year of continuous production, the value of

this plant for Australia can now be assessed.

Cement is being produced at a rate of 900 tons per week. Its total capital cost was slightly over 6 pounds Sterling (Australian pound worth about \$2.23) per ton annual cement producing capacity.

At present 45 men are engaged in production. Fuel consists of a blend of Victorian brown coal, containing about 50 percent of moisture, and coke breeze. Power consumption is averaging about 100 kw.h. per ton of cement produced.

(Continued on page 126)

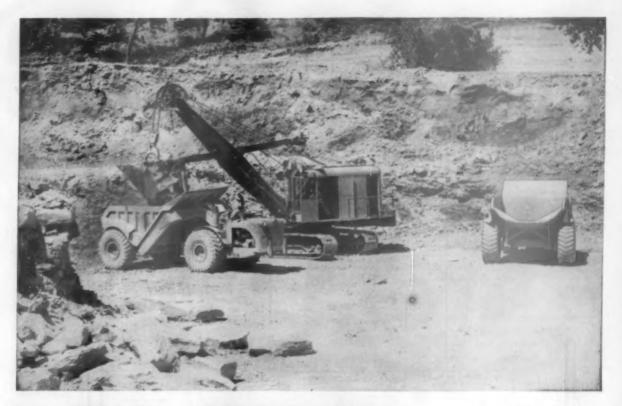




Blower for the vertical shaft type kiln



Three-compartment finish mill with two table feeders, above



Four TR-200's work up to 460 hours a month ... average only 4 hours down time

In less than a year, the George W. Kerford Quarry Company, Atchison, Kansas, put 3,828 hours of work time on each of their four Allis-Chalmers TR-200 Rock Wagons. They piled up 460 hours a month over one five-month period. During the year, service down time for each unit averaged only 4 hours a month... this means that each rock wagon was on the job over 98 percent of working time!

The TR-200's have been hauling quarry stone from the pit to a crushing plant 1½ miles away. Loads average 16 tons and each cycle is completed in 14 min. Fuel consumption has been about 3¼ gal per hour with no oil needed between changes.

George E. Kerford states, "We like the TR's maneuverability and easy control, which makes it possible for any good truck driver to learn to drive the outfit quickly. The wagon body is well constructed and cleans easily and completely. We find that most parts needing frequent maintenance and repair are easily accessible,"

HERE ARE THE FEATURES
BEHIND THIS OUTSTANDING RECORD



Big bowl top makes excellent target for shovel or dragline operator, helps loading under bins or chutes.

Migh power-ta-load ratio of 16 hp per yard of capacity speeds hauling, helps on steep grades.

Maximum lift angle of 70 degrees speeds dumping of any type material, Big opening and "bathtub" design slide loads out fast at minimum dump angles.

Dumps 30 in. back of roar wheels to put entire load over banks or into hoppers.

Wheel base stays fixed during dumping cycle for greater safety on banks, accuracy in spatting loads. Four-wheel air brakes allow full control, safer dumping over banks.

Hydraulic control system raises or lowers bowl while traveling, gets TR-200 into position sooner.

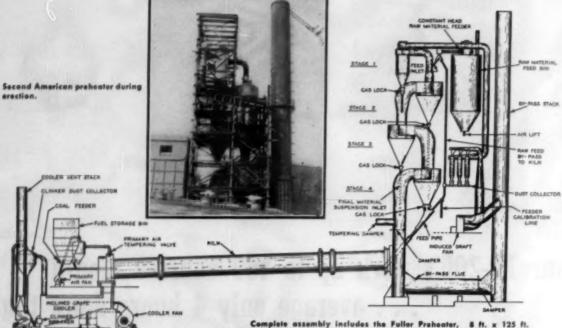
176 hp engine — 5 speeds forward to 21.6 mph, reverse 2.5 — 11 yd struck, 15 yd heaped, 18 tens

Write for complete catalogs or ask your Allis-Chalmers dealer for a demonstration ALLIS-CHALMERS

A combination that's hard to beat . . .

Fuller Preheater and

HUMBOLDT SUSPENSION TYPE



Complete assembly includes the Fuller Proheater, 8 ft. x 125 ft. retary kiln, and a 6 ft. x 22 ft. Fuller Inclined-Grate Cooler. Allentown Portland Company.

For more efficient rotary-kiln operation, the combination of the Fuller Preheater (Humboldt suspension type) and the Fuller Inclined-Grate Cooler offers the ultimate in overall economy. From beginning to end . . . from the time your raw materials enter the preheater until they are discharged from the cooler, this combination of equipment results in improved operations, increased capacities, and reduced fuel ratios.

The Fuller Preheater is proving, in actual operation, all of the claims made for it.

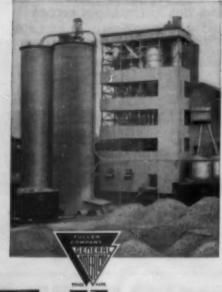
Effective use of kiln waste gases to preheat raw materials prior to their entry into the kiln.

Increased clinker production with relation to kiln volume, with reduction in exit gas temperatures to between $500^{\circ}F$. $-600^{\circ}F$.

Typical installation in actual operation—capacity increased from 860 barrels to 1500 barrels per day.

Lower fuel consumption per barrel of clinker produced. Actual operation over an extended period showed consumption reduced from 1,100,000 Btu to between 650,000 and and 700,000 Btu per barrel.

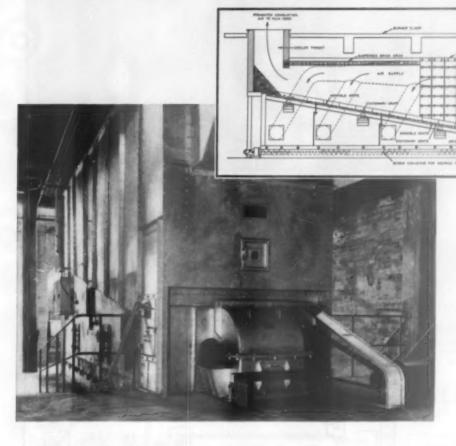
The Fuller Preheater will, without a doubt, extend the life of many existing short kilns. For such short kilns, as well as new kilns, the Preheater is designed so that the only capacity limitation is the practical fuel-burning capacity of the kiln.



Fuller

DESIGNERS AND BUILDERS OF BETTER CEMENT

Fuller INCLINED COOLER



The Fuller Inclined-Grate Cooler, an outstanding contribution to the cement industry, has met with universal success. One of its principal attributes is its unusual capacity to effect a wide range of cooling, in an economical manner, and to recover a maximum of clinker heat relative to the quantity of combustion air available. Heat recovery, approaching the theoretical maximum recuperation, is obtained because the secondary combustion air passes through the hottest zone of the clinker bed. APPROVAL of fuel savings. Users of Fuller Coolers have reported savings as high as 15%, due to recuperated heat returned to

APPROVAL of fast, effective air quenching. The Fuller Cooler

gives the user definite quality improvement whenever required. APPROVAL of increased grindability of cement clinker. Laboratory tests and reports from users have confirmed grindability increases ranging to 20% for Fuller cooled clinker.

Fuller Coolers in addition to Portland cement clinker, are handling materials such as nodulized phosphate rock, pebble lime, ores, dolomite, and iron nodules, at a current rate of approximately 1,000,000 barrels per day (185,000 tons). Over 530 coolers are installed or on order.

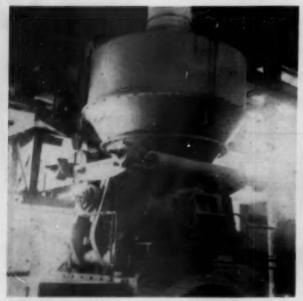
Why not take advantage of Fuller's long experience in material handling and cooling . . . a talk with one of our engineers may lead to more profitable operation.

FULLER COMPANY, Catasaugua, Pa.

GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY Chicago · San Francisco · Los Angeles · Seattle · Birminghom

PLANT EQUIPMENT FOR OVER A QUARTER OF A CENTURY





Air-swept rew grinding mill which dries and grinds in one operation, and can be fed material having up to 15 percent moisture



Ten-comportment dust collector connected to row grinding mill has filter sleeves

Efficient Vertical Kiln

(Continued from page 122)

The initial operating period of the plant was marred by difficulties experienced in the limestone quarry where, after two months of production, an increasing number of clay pockets appearing in the quarry face hampered

operations. This situation forced a change over to another quarry, involving problems of plant adjustments which affected production until August last year. Since the changeover to the new quarry was completed, the plant has been producing efficiently.

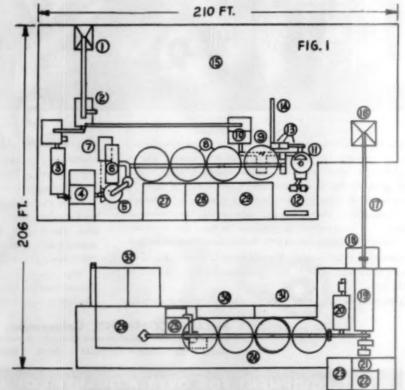
Fig. 1 shows the layout of the plant

on a 200 ft. square area. Limestone and marl are dumped into a concrete lined pit from which a plate conveyor feeds a hammermill that reduces shovel-size limestone to minus ¾ in. size. This is a "non-clog" type hammermill supplied by Hammermills Inc., Chicago, incorporating a movable breaker

Legend for Cement Plant Layout

- (1) Raw material dumping pit and
- Plate conveyor Hammermill for raw material and brown coal crushing Wet weather drying drum
- Hoppers for row materials Air swept row mill Filter for row mill (5)
- (6) (7)
- Furnacs for raw mill
 Raw meal siles
 Raw meal proportioning equipment
 Crushed coal hopper and vibrating (10)
- screen, conveyor Vertical kiln and nodulizer, feeder, (11)

- etc.
 Kiln blower
 Clinker discharge and crushing
 Clinker conveyor
 Covered storage area for raw materials, coal, clinker, gypsum
 Feeder hopper for clinker and gypsum (elternate)
 Inclined belt conveyor for clinker (16)
- and gypsum
 Feeder happers for clinker and gypsum Coment mill
- (19)
- (20) (21) (22) **Dust collector for coment mill**
- Switchroom
- Transformer, 1000 kv.a.
- (28) Compressor
- Cement siles
- (25) Packing plant and dust collector
- (26) (27) (28) (29) Bag storage Laboratory Technical office Workshops Foremon's room
- (30)
- Stores Administration offices (32)



Layeut of coment plant and equipment arrangement



THIRD MARION FOR EASTERN CEMENT PLANT

An eastern producer of Portland Cement bought their third MARION machine to round out a recent expansion program.

The selection of a MARION 101-M for this New York State operation is a tribute to the satisfaction two earlier MARIONS have given in heavy digging.

Get the full story on this heavy-duty 3-yard machine, available either with diesel or electric power.

MARION

MARION POWER SHOVEL COMPANY MARION, OHIO, U. S. A.



A Sobildiary of Morritt-Chapman & Scott Corporation

PILE DRIVERS . WALKING DRAGLINES



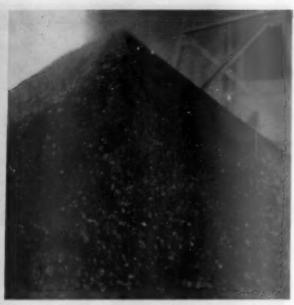
DRAGLINES - CLAMSHELLS - LOG LOADERS CRANES, CRAWLER & RUSBER MOUNTED - BACKNOES

Your Confidence Is Justified //

Where This Flag Flies



Nedulizer adjustable to produce nodules of various sizes supplies kiln feed material



Clinker which has been passed through shaker conveyor and jaw type crusher

plate having a separate drive. The finely crushed limestone is lifted by bucket elevator into feeder hopper from which it is sent to a rotary dryer fired with brown coal. Limestone and marl, stored in separate hoppers, is fed by variable speed apron feeders to an airswept Loesche mill. This mill dries and grinds in one operation, and can be fed with material having up to 15 percent moisture content. However, its output is considerably increased (up to 121/2 t.p.h.) if the moisture content is lower, hence the necessity for preliminary drying. The mill is driven by a 175-hp. Crompton-Parkinson a.c. motor, and the finely ground material is air swept through variable speed classifier and cyclone to a 10-compartment dust collector with Beth type filter sleeves. Raw meal (ground stone and marl) and dust are discharged into a screw conveyor on top of four raw material silos of about 1000 tons capacity. All silos are equipped with porous aera-

tion tiles supplied by Aerox, United Kingdom, for fluidizing the raw ground material and thus facilitating blending and discharging from the silos.

Silo No. 1, reserved for the kiln feed, has at the bottom a tube screw conveyor keeping a fluidized proportioning box of about 1 cu. yd. capacity continuously full, by maintaining a permanent overflow. A 3-in. discharge pipe from this proportioning box with a conical regulation valve permits accurate proportioning to the mixing screw conveyor.

Coal is crushed in the hammermill, mainly during the night shift, and transported to a "cateract" vibrating screen, manufactured by Jaques Bros., Melbourne, with oversize returning to the hammermill. Fines passing the screen into a 40-ton capacity coal hopper go to a swinging type proportioning belt that permits accurate adjustment of coal feed into the mixing conveyor. This conveyor, blending ground raw material and coal in the required

proportion, sends it to a bucket elevator to the top of the kiln where it is fed to a pan type nodulizer. Most of the conveying equipment has been manufactured by Messrs. Jaybee, Dandenong, Australia.

Nodulizer Operation

The nodulizer can be adjusted to produce nodules of various sizes, but since its initial adjustment no alteration was necessary, and the kiln is producing at the uniform rate with clockwork precision. The nodulizer is placed immediately above the kiln and can be easily supervised by the kiln burner. The nodulizer is locally manufactured by Messrs. Fleet Forge, Melbourne. A rotary type feeding chute distributes the nodules into the kiln which has a Spohn type conical enlarged top. The principal castings of the kiln plant, including feed chute, rotary discharge gate, main shaft, worm wheel drive and hydraulically operated discharge gates were delivered by Loesche of Dusseldorf, Germany. The firebrick lining, which is now in continuous service for over a year and does not show any signs of deterioration, consists of high magnesia brick in the hot zone.

Clinker Grinding

The clinker is discharged through a shaker conveyor and jaw type clinker crusher. The crushed clinker is carried by bucket chain elevator, with cast steel roller sheaves, to a plate conveyor and then into the raw material and clinker storage area, where it is handled by two front-end loaders. Dust is collected by a 36-sleeve dust collector.



Attractive exhibit of Cippsland Industries, Ltd., Traralgon, Victoria, Australia



TAPER-LOCK

OFF THE SHELF NO REBORING!

The shot are

Ready for the shaft, with no costly, time-consuming operations to make them fit. That's the big news about Dodge Taper-Lock Sprockets. Taper-Lock grips the shaft with the firmness of a shrunk-on fit, yet comes off easily. Bushings may be re-used. They come in sizes to meet most every application.

Taper-Lock Sprockets are available from Distributors' stocks in a complete range of B-type steel sprockets-1/2" through 2" pitch. Dodge quality Roller Chain is packaged in 10-toot lengths—also available in 50-foot and 100-foot reels. Save time—save money—keep production rolling-get Dodge Taper-Lock Sprockets and Roller Chain from your Dodge Distributor.

DODGE MANUFACTURING CORPORATION, 2600 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distrib-tor, for valuable assistance on new, cost-saving methods. Look to his name under "Power Transmission Machinery" in your classified telephone directory, or write no.

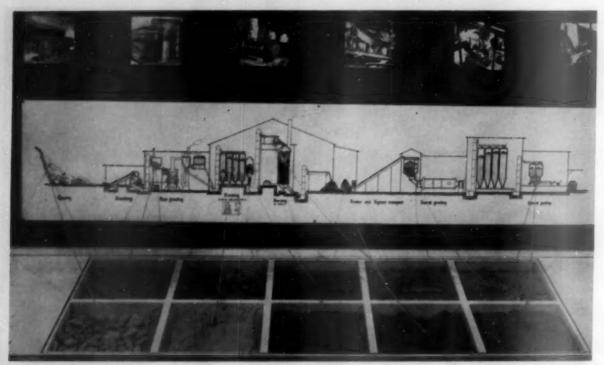


THE BUSHING THAT MOUNTS FLUSH!



Standardize; economize with Taper-Lock, the bushing that is interchangeable in Dodge sprockets; sheaves, couplings and conveyor pulleys. More than 2,000,000 in use!

of Mishawaka, Ind.



Close-up of exhibit showing schematic elevation drawing of vertical shaft cement kiln plant. Cords connect from drawing to compartments of box containing products from raw crushing and grinding to finish grinding of clinker, packing and shipping

Clinker and gypsum are fed alternately by a rubber belt conveyor to the feeding hoppers of the cement mill which is a three-compartment, central-drive Krupp mill driven by 475 hp. Siemens a.c. motor. A Beth type dust collector keeps the cement mill building dust free. The cement is conveyed by bucket elevator and screw conveyor to four concrete silos of 1200 tons capacity, each having fluidized discharge arrangements, then into a cement collecting screw conveyor for blending and conveying into a packing hopper at the bottom of which is a three-tube Bates packing machine complete with dust collector and bag conveying equipment.

A 200 c.f.m. 100 p.s.i. Broomwade stationary air compressor provides the air requirements for the plant.

Water requirements of the plant are amply covered by a creek running along the plant site about 40 ft. below building level. The power requirements of about 650 kw. are supplied by the State Electricity Commission's Yallourn power plant through a 1000 kw.-a. transformer.

Development of the Vertical Kiln

Use of vertical kilns for the manufacture of cement is not new—actually they were the first kilns used by the industry. However, these shaft kilns, as they were called at the time, were very difficult to operate and the quality of cement produced was far from satisfactory. For this reason they were

discarded as obsolete and replaced by rotary kilns.

Possibilities of efficient heat transfer have always been considered as better in the shaft kiln even in the crudest type, than in the rotary kiln, and much research was carried out prior to and during World War II to improve this method. The principal improvements were on the feed. In earlier shaft kilns, the raw meal-fuel mix was pressed to bricks, later to briquettes. However, this type of feed did not permit uniform burning and discharge through the grate. A great improvement was to use nodules' of near uniform size which also affected an improvement of clinker quality.

Using a blend of brown coal and coke breeze proved to be particularly successful in the Gippsland plant. The easy ignition of brown coal eliminated completely the loss of edge-fire, or similar troubles often experienced with shaft kilns using non-volatile fuels

only. Practical experience in the Gippsland plant proved that only a small percentage of the volatile matter of the brown coal escapes through the kiln stack unburnt, the larger part ignites in the kiln, thus producing useful heat. Some of this heat is "low grade" heat, but there is no difficulty in attaining the necessary clinkering temperature in a hot zone of about 6 ft. depth, assuring complete sintering.

Fuel consumption is highly economical and the quality of clinker is satisfactory and uniform. The kiln can be stopped over weekends and holidays without any detriment to the firebrick lining or clinker quality, though it is essential that experienced kiln operators follow certain rules.

Cement produced is in strict conformity with Australian Standard Specification Requirements with strength results considerably above requirements as shown by the accompanying tabulation:

ROCK PRODUCTS, 1980, October p. 118. (Burning Cement in Shaft Kiins)

Loss on Ignition
Insoluble Residue
Sulphurle Anhydride (SOs)
Magnesia
Setting Time Percent
Initial Set
Hard Set
Hot Harth Fai.
Constancy of Volume
Compressive Strength
Water Und Percent
Age S days
7 days
38 days
Temperatures of Storages
Moist Cupboard

Max. 5.00 percent Max. 2.00 percent Max. 2.75 percent Max. 4.00 percent Min. 1 hour Max. 12 hours Max. 5.0 mm. (Continued on page 174)

Results

2.22 percent
0.95 percent
1.64 percent
1.64 percent
2.55 percent
2.56 percent
2.67 perce

Set Soth bearing features



fully enclosed and protected

ances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps,

easy to grease

You can lubricate the bearings without dismantling the motor. Pipe-tapped holes in the bearing housings at three points provide both means for inserting new grease and a means of flushing out old grease.

Look for the extra bolts on the end housing . . the sign of greater value. Ask your Allis-Chalmers representative or Authorized Distributor to show you a cutaway section of this maintenance-cutting design. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7225.





What to Look for In Selecting Cement Raw Materials

By JOHN A. WOLFE*

• Some of the important chemical and economic aspects in the choice of portland cement raw material sources

FACED WITH DEPLETED SUPPLIES OF RAW MATERIALS, the cement industry is further troubled by stricter specifications which make some deposits no longer acceptable or require selective quarrying or beneficiation. Growth of residential areas into what was once a rural industrial area also brings controls on blasting practice and upon waste disposal and dust. Keeping production costs down is becoming more difficult.

Raw material has to be very inexpensive in order to be competitive. It can rarely bear either royalty costs or the capital or operating costs of beneficiation. The properties of the raw materials must be such that they contribute to low-cost processing. This includes studies of grindability, dust losses, temperature necessary to obtain reaction, and water retained in kiln feed in addition to chemical constituents and quarrying costs. On the other hand, if full advantage is taken of the properties of a raw material, both capital and operating costs can be appreciably reduced.

Functions of the Oxides

Before discussing the sources of the oxides in portland cement, it is desirable to summarize the part played by each in clinker formation. Silica and lime form the cementitious compounds. Alumina causes high heat of hydration and contributes to the early strength of concrete. It acts as a flux, lowering the temperature of formation of the cement compounds. Iron oxide further lowers the reaction temperature and combines with the tricalcium aluminate (C₅A) to form tetracalcium aluminoferrite (C₄AF), lowering the heat of hydration.

Depending upon cooling conditions, from 3 percent to 6 percent MgO can be held in solid solution in the glassy phase of the clinker and in chemical combination. If MgO crystallizes out in the product as periclase, this compound is slow to hydrate and causes expansion of the concrete.

The alkaline oxides, Na₂O and K₂O,

further lower the melting point. It is thought that they contribute markedly to the expansion and disruption of concrete when used with some aggregates, such as those containing opal, decreasing its resistance to freezing and thawing.

Raw Materials Used in Cement

There are a few deposits of rock so close to the proper composition of portland cement that they are called "cement rock." However, specifications have become more exacting and fewer deposits have been able to meet the "mix" requirements without proportioning two or more raw materials.

There seems to be a misconception that the closer the limestone is to 100 percent calcium carbonate, the better it is for cement manufacture. Actually, the further the analysis is from the proper composition, the more expensive the manufacturing process becomes. Finer grinding and more mixing are required to give a uniform raw feed. In a wet process plant this requires more moisture to produce a pumpable slurry, increasing the fuel requirement. In addition, control of mix becomes much more difficult. With relatively pure constituents, if the proportions of one component should vary by one-half of one percent the CoS content will be varied by 5 percent. It is probable that the constituents, as received in the mill, are not completely homogenous within themselves, and closer control is required to prevent variation. Proportioning is subject to both mechanical and human errors, affecting the quality. If the analyses of two constituents vary only slightly from that desired in the end product, slight changes in proportioning make little difference in the uniformity of compositon of the finished product. Pure limestone is less desirable than an argillaceous limestone, as long as the impurities are not of a type or in an amount that is pro-

In addition to preparing the proper chemical composition of the raw mix, it is essential to approach completely homogenous material in the feed to the cement kiln. In burning, the tem-

peratures reached are those of incipient fusion in clinker formation. Only approximately one-fourth of the mix ever reaches a fluid state. It is, therefore, necessary for the molecules to diffuse in a solid state to form the proper chemical compounds. If retained at a high enough temperature for a long enough time, even particles of appreciable size can react and reach chemical equlibrium. In practice, it is essential to keep the time in the burning zone and the temperature to a minimum. Variations of the physical properties of the constituents affect the economy of cement plant operation at this point.

If there is a choice of raw materials, deciding which source to utilize depends upon balancing costs resulting from all of the physical properties of the rock throughout the manufacturing process against the quarrying and transportation charges. Investigations in this field promise to contribute much to the economic operation of cement plants. Petrographic examinations of some of the constituents have established certain principles, but a great deal of work with X-ray studies and differential thermal analysis needs to be done.

Calcareous Component

Chemically, all limestones contain calcium carbonate. However, the energy required to reduce a travertine or chalk may be less than one-half that required to reduce a massive or crystalline limestone. While travertine is easily pulverized, volatilization losses can be extremely high, giving low yield, thus offsetting an apparent economy.

One very common impurity in limestone is chert. In the quarry, chert increases costs by rapid wear on drill bits and handling equipment. Excessive wear carries on through the crushing system and through the ball mill where the chert particles are much more difficult to grind than the limestone. At relatively high cost, the chert particles can be ground to a size that will pass through the system, but the individual particle of silica may

(Continued on page 188)

A revised version of a talk presented by Mr. Wolfe, chief geologist, ideal Cement Co., to the Industrial Minerals Conference, A.I.M. C., in Salt Lake City, Utah.

UST*Continental Idlers

UNIT-SEALED PRE-LUBRICATED TIMKEN BEARINGS

Saves Grease

Saves Labor!

Saves Belts!





UNIT-SEALED



PRE-LUBRICATED



TIMKEN BEARINGS





Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klozures, are the answer to the operator's prayer.

The Unit Bearing Assemblies-"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellent grease of a stable consistency with a wide temperature range for long life.

Most important—this construction permits operating the Continental "UST" Idler without relubrication for 1-2-3 years depending upon the severity or character of conditions.

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For detailed information on these idlers write for Bulletin R. P.-116.





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ENGINEERS



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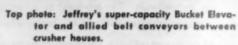


practical engineering

A large Ohio limestone quarry tossed us a tough problem. They wanted their primary and secondary crusher buildings closely-knit for efficient supervision and maintenance. This called for a conveyor requiring little horizontal space to handle large quantities of stone from below the primary crusher to the top floor of the secondary crusher house.

Tight teamwork by Jeffrey conveyor engineers and production men gave the ultimate answer...a custom-built, super-capacity Bucket Elevator that carries as much as 900 tons of stone per hour up a steep incline.

Over the years, Jeffrey has built several special conveyor systems to integrate the various operations at this quarry. Each was designed for its specific job. Each is a credit to the solid engineering-production skill Jeffrey has ready at your command, no matter what type of plant you have.



Center Drawing: Overall view of both crusher houses and integrated conveyor systems at plant.

Bottom photo: Head end of super-capacity bucket elevator showing rugged Jeffrey construction.

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Secondary crushing plant has two impactors, each with a capacity of 350 t.p.h., two 5- x 9-ft. two-deck vibrating screens, and two single-deck screens in series

Dual Belt Conveyor System Serves Southwestern's Crushing Plant

By WALTER B. LENHART

New crushing plant operated by Southwestern Portland Cement Co., near Victorville, Calif., is housed in modern all-steel structures. Three types of drills speed up quarry operations

A NEW CRUSHING PLANT was recently placed in operation by the Southwestern Portland Cement Co. at the Black Mountain high-calcium limestone quarry 17 miles northeast of Victorville, Calif. Formerly, the stone was crushed at the cement plant. A

broad gauge railroad connects the new crushing plant with the cement operations.

The quarry is located well up the side of Black Mountain with a relatively high face that is being cut down so that eventually the benches will be in the 60-ft. high range. The deepest primary holes now being drilled are 225 ft. The quarry has a nominal production of 6500 tons per day.

The high calcium limestone is almost black in color; is somewhat marbleized and tends to break rather blocky. Primary drilling is done with four 29 - T. Bucyrus - Erie tractormounted, churn drills augmented by a Joy rotary drill, operated dry. The churn drills use 9-in. bits and drill at the rate of 3 ft. per hour. The Joy rotary puts down a 7%-in. hole with a Hughes bit at the rate of about 100 ft. per 8 hr. The stone contains about nine percent silica. At 1800 ft. of hole, a rotary bit must be replaced.

Holes are drilled, for the most part, to suit local conditions but when possible the centers are 21 ft. with 20 ft. of burden. Mostly 60 percent explosives are used and the holes are fired with Primacord delays. Drilling is done on a two-shift basis with the crushing plant operating one shift.

The company also placed in opera-



View of secondary crushing plant looking toward long belt conveyor leading to stockpiling and carloading area



Elevation and plan details of new crushing plant and conveyor system

tion a Travel Drill similar to those described in ROCK PRODUCTS, March 1953, page 91, and the May, 1954 issue. The company also has a second Travel drill at the El Paso, Texas quarry. This is the third drill of this type to be used in cement quarries west of the Mississippi river. It is a secondary drilling machine, and at Victorville replaces five jackhammers.

Secondary Drilling

The Travel drill at Black Mountain quarry is mounted on three heavy, rubber tires, the third being to the rear. This permits the unit to turn in a short radius. The main frame supports a Gardner Denver, 2-stage, water cooled, 230 c.f.m. air compressor driven by a 75-hp. Caterpillar D-318, 6-cylinder diesel. A 40-ft. boom is fastened to the front end of the deck. On this boom is an operator's chair and a 3-in. Gardner-Denver drifter that uses 11/2 in. Timken tungsten carbide insert bits. All operating functions of the 3-wheeled unit, raising and lowering of the boom, and the operation of the air drill itself, are conducted from the operator's chair. Only one man is required to do the drilling and, due to the greater weight of the air drill, holes are put down quite rapidly. The boom can be moved laterally through

an angle of about 100 deg. Loose rock in the muck pile need not be barred down; it can be drilled "as is." The machine can reach as high as 33 ft. in the muck pile and can reach as much as 44 ft. over the toe of the pile. Boulders do not have to be



Trucks dumping to 42-in. gyratory crusher

placed by the shovel operator nor is there any air hose to drag over the rocky surfaces. The drill is a Scries 35,000 Model and, being completely mobile, can be moved from face to face without dismantling. On the public highway, the drill can be dismantled in a few hours and can be towed by a truck using a tow bar that is supplied by the manufacturer.

Three 3-cu. yd. Marion electric shovels load quarry trucks. There are six Mack units, each hauling a 10-ton payload, and two semi-trailer units that each haul 30 tons. Any incidental water used at Black Mountain must be hauled in. Personnel live in Victorville with an excellent paved road serving the quarry and town.

Crushing Plant

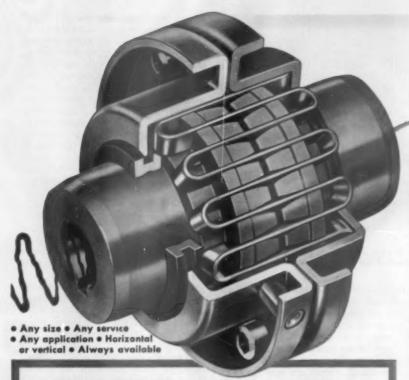
The new crushing plant is of steel construction throughout, and is modern in design with all units placed in a straight line. The primary crusher is a 42-in. Allis-Chalmers gyratory crusher with trucks dumping direct to the unit. Over the crusher is a steel building supporting an electric hoist with ample capacity to lift any repair parts. Crushed stone (minus 5-in.) moves by belt conveyor to a surge pile ahead of the secondary crushers. In the reclaiming tunnel under this pile are two parallel 36-in. belt conveyors with each delivering to a secondary crushing unit. The two secondary crushers are Pennsylvania impactors that handle 350 t.p.h. each, reducing the 5-in. stone to 34-in. Some circulating load is maintained between the screening section and these crushers. There are no grids in the impactors; hammers and breaker plates only. Each of the 36-in. belt conveyors to the impactors is fed by a Jeffrey heavy duty vibrating feeder.

Each belt conveyor delivers to a 5-x 9-ft. Robins two-deck screen that has 3-in. and ¾-in. wire mesh, respectively. The top deck is more of a wear-taker. Plus stone goes to the impactor with the throughs passing to a 30-in. belt conveyor that delivers to two more Robins single-deck screens that operate in series. Plus material from these screens is returned by short belt to the hammermill. The minus ¾-in. stone is picked up by a 36-in. collector belt and delivered to a 25,000-





Moveble secondary drill with elevating boom permits drilling in difficult positions



Why FALK Steelflex Couplings give the <u>finest</u> protection for connected machinery

Maximum protection of connected machinery is best provided by Falk Steelflex Couplings because, thanks to their exclusive design, they overcome the damaging conditions of shock loads, shaft misalignment and vibration. How this unique multiple protection is made possible is shown at the right.

Falk Steelflex Couplings give the <u>most economical</u> protection, too, because they make connected machinery last longer and give better service. Furthermore, when actual coupling costs are figured <u>per year of service</u>, Falk Steelflex Couplings show substantial savings through their rugged <u>all-steel</u> construction, easy interchangeability and low maintenance requirements.

The basic Type F Steelflex Coupling—in 33 sizes to cover capacities from 2/5 through 70,000 hp per 100 rpm—meets over 90% of all industrial applications. Special or Dual Purpose Steelflex Couplings are available for problem applications. Write to Department 247 for engineering bulletin, including selection and dimension details.

Exclusive FALK Steelflex grid-groove design smothers shock and vibration.

The damaging effects of shock and vibration can short in the life of any connected machinery. Here is how the Steelflex of degroove design overcomes these common enemies.



Under LIGHT LOADS

The gridmember bears only at outer edges of grooves. The long span between points of contact remains free to flex under loed variations.



Under

MORMAL LOADS
As load increases, the
distance between supports on the grooves is
shortened proportionately, but a free span
remains to cushion
sheek loads.



Under SHOCK LOADS

Under extreme overloads, the grid-member bears fully on the grooves and transmits full load directly. The coupling remains flexjble, within its rated capacity.

...Accommodates shaft misalignment and free end float

Basic maintenance procedure dictates regular inspection and correction of shaft alignment, Between inspections, Steelflex couplings provide protection by accommodating unavoidable shaft misalignment and end float. The gridmember which connects the two hubs of a Steelflex coupling is not fastened to either hub, so each hub can shift without imposing load on the other shaft.



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- Contract Machining

FRALS...a good name in industry



Cor-leading terminal loads out an 80-ton car in three minutes. In the background is a 25,000-ton capacity stockpile of crushed and screened limestone

ton capacity surge pile that has a live capacity of about 12,000 tons. Below this pile is a 48-in. loading belt conveyor fed by two Jeffrey vibrating feeders. An 80-ton open hopper can be loaded in 3 min. by the loading belt. From the quarry to the plant, the rail haul is down grade in favor of the loads. Two General Electric standard gauge diesel locomotives operate on the trackage.

Rocky's Notes

(Continued from page 49)

of a solution of a metal salt causes rapid polymerization [joining together] to polysilicate ions. Since the polysilicate ions are not of uniform size, they cannot arrange themselves along with the metal ions in a regular crystal lattice. Thus when polysilicate ions combine with metal ions, the resulting insoluble precipitate is almost always amorphous [colloidal]."

This seems to account for the fact that the hydrating of portland cement, as in ordinary concrete practice, does not produce crystals of calcium silicate, although such crystals have been produced by mixing dilute solutions of lime in water and a dilute solution of silica in water. Our author explains further: "Polymerization of basic metal ions is another factor which may interfere with crystallization. When the metal salt is mixed with the silicate, the increase in pH in the environment of the metal ions at some point causes the formation of polymeric basic metal ions or colloidal metal hydroxide, which likewise cannot fit into the silicate crystal. For these reasons, the precipitation of a metal silicate from aqueous solution at ordinary temperature does not yield crystalline silicates, but instead usually results in a colloidal mixture which may be visualized as an adsorption of

metal ions on gelatinous silica or as a mutual coagulation of the positively charged colloidal metal hydroxide and negatively charged colloidal silica."

One more quotation, we believe, completes the picture of what the calcium silicates formed in the hydration of portland cement are actually like: "It will be evident that 'colloidal silicates' may vary from rather homogencous colloidal aggregates of extremely small ultimate units of polysilicate acids and metal hydroxide to heterogenous masses in which either silica or the metal hydroxide is present as discrete colloidal units, held together by the other component." Additional evidence is presented that the metal ions (sodium, calcium, etc.) are not adsorbed directly on the silicate particle, but only after the particle has adsorbed an outer layer of (OH) ions. There are various ways of estimating how many such (OH) ions there are per unit of area of the silica exposed. From such data it should be possible to determine how much Ca and Ca-(OH), can be adsorbed on a silica gel formed in the hydration of portland cement. That which is not adsorbed (or combined, in the language of portland cement chemistry) is then free Ca(OH), or temporarily in solution in the free water.

Apparently one is justified in theorizing that this excess Ca(OH), serves no useful purpose in promoting strength of concrete. Of itself it has no cementing properties. It may serve as a filler in the pore structure and hence promote density, but it can eventually all dissolve out in concrete exposed continuously to fresh water supply. Apparently the chief function of the extra lime in high tricalcium silicate cement clinker is to promote the rapid production of silica gel. However, there are other ways of pro-

ducing silica gel. For example, our author describes a new silica sol which can be evaporated to a dry powder that can subsequently be dissolved in water to give a colloidal solution of silica. It probably is expensive to produce commercially at this time, but it would seem that here is the ideal cement. If it is found that a so-called calcium silicate is absolutely necessary, the lime could be added as Ca(OH)₂ or as pulverized limestone (CaCO₀) in just the right amount to make a monosilicate (CaO·SiO₂) which is universally recognized as a permanent binder.

Mining Show in Las Vegas

AMERICAN MINING CONGRESS will hold its 1955 Metal Mining and Industrial Minerals Convention in Las Vegas, Nevada, October 10-12. Some two thousand mining men are expected to air their views on national policies and to discuss the latest advances in mine and mill operations. Chairman of the national program committee for the convention is L. J. Randall, president, Hecla Mining Co., Wallace, Idaho.

The program will include discussions of such important subjects as mine taxation, labor relations, public land policies, government mineral programs, tariffs, and problems of the rapidly expanding uranium industry. Speakers for the event will include top leaders from industry, mineral policy-making officials of the federal government, and a substantial number of congressmen and senators interested in maintaining a strong domestic mining industry. Particular attention also will be given to new developments in production techniques, at both underground and open pit mines and plants. Active in arranging of plans for the meeting is Roy A. Hardy, consulting engineer, Getchell Mine, Inc., Reno, Nev., who is chairman of the Western Division of the American Mining Congress.

Geological Report

CALIFORNIA JOURNAL OF MINES AND GEOLOGY, in its April 1955, issue, contains a report on the "Mines and Mineral Resources of Sacramento County" by D. W. Carlson, staff member of the California Division of Mines; it is accompanied by a geologic map of the county printed in color. The report indicates that sand and gravel production in the county, valued at \$4 million annually, ranks ahead of gold but is second to natural gas (output valued at \$14 million).

IDEAL CEMENT Co., Denver, Colo., has started exploration for uranium in a 150- to 200-mi. radius of Laramie, Wyo.



Soft touch for top tonnage! ELECTRONIC CONTROL

WHAT! . . . a control system that can make as much as 10% difference in electric shovel production? Yes, it can . . . and does! Actual tests reveal these two outstanding reasons:

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ONE: Electronic Control is practically effortless. As a matter of fact, P&H Electronic Control was so completely effortless that we had to build in a slight one-lb. pressure so the operator could feel it. Result: The fatigue factor is so minimized that production at the end of the shift is comparable with that at the beginning!

TWO: Electronic Control through thyratron application provides instantaneous shovel response on all motions! Convenient grouping of controls lets operator and machine perform at peak efficiency under all operating conditions.

P&H electronic control users say it's the last step in the evolution of fine controls. We will gladly send full information. P&H Electric Shovel Division, Harnischfeger Corporation, Milwaukee 46, Wis.



HARNISCHFEGER





















Aerist view of crushing and screening plant, storage and loading facilities. To the right are the six inclined tracks from which cars dump their loads to storage piles containing various sizes. Carloading conveyor may be seen to the extreme right

Long Conveyors and Reclaiming Tunnels Speed Up Stone Plant Operations

ONG

By HUBERT C. PERSONS

How Camp Concrete Rock Co. produces 1,500,000 tons of limestone annually is a story of exceptionally large modern machinery, operated by an efficient, intelligently directed working force. The Camp Concrete Rock Co., with headquarters in Ocala, Fla., has 5200 acres of land underlaid by a strata of crystallized limestone, two miles west of Brooksville, Fla. Plant facilities include a belt conveyor more than three-quarters of a mile long, hundreds of feet of concrete reclaiming tunnels, machinery for three

silos. Material is drawn from silos to electrically operated skip cars for open stockpiling

stages of crushing and a series of big vibrating screens and washers. Although only about 500 acres of the

 Camp Concrete Rock Co. plant at Brooksville, Fla., produces six stone sizes which are placed in individual 30-ton concrete

ent, stone is being taken from three faces in the quarry. Tests show that the stone contains an average of 96 percent calcium carbonate.

Only a shallow overburden covers the limestone. This averages 18-in. in depth and a maximum of 3 or 4 ft. Stripping of the overburden is done

during the winter and early spring

when the weather is generally dry.

quarry land is being worked at pres-

pany's four Caterpillar crawler tractors equipped with bulldozers. Three of these tractors are Model D 8 and one is a Model D 7. The same equipment plus an 8-cu. yd. Heil and a 16-cu. yd. Caterpillar scraper are used in quarry clean-up work and in building and maintaining roads through the company property. The overburden material is used to fill low places and swampy areas.

Quarry Operations

The deposits occur in strata varying from 25 to 55 ft. thick. Drilling of blast holes is done with a Mayhew rotary drill mounted on an International Model L-190 truck at a rate of 70 to 90 ft. of 6-in. dia. holes per hr., using Varel bits. After 3000 ft. of drilling, bits are retipped to be used for another 3000 ft. From 4000 to 5000 lb. of dynamite is used for each blast. Between 10,000 and 15,000 cu. yd. of matrix is produced by individual blasts which are fired twice a week in each pit. About 50 percent of the matrix is washed away during stone processing.

Four Model 54 B, 2½-cu. yd. Bucyrus-Eric electric shovels are used to load the blasted stone into trucks. A fleet of ten 24-ton, rear-dump Euclid trucks, powered by 300-hp. Cummins diesel engines, haul the stone to a hopper from which it is fed over a live-roll grizzly. This separates the



Belt conveyer, 4000 ft. long, moves stone at the rate of 400 f.p.m. from primary crusher in quarry for further processing in the main plant

Why do More and More Truck Operators Specify Eaton 2-Speeds?



Because—Eaton 2-Speed Axles provide speed with no sacrifice of pulling power, improve vehicle performance and maneuverability, and assure safer operation. They reduce wear and tear on engines and power transmitting parts, cut operating and maintenance costs. They keep trucks on the job, add thousands of trouble-free miles to vehicle life, and make trucks worth more on the trade-in.



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A 21/2-cu. yd. electric shovel in quarry loading houlage unit

minus 6-in. stone and by-passes it around the primary crusher. The plus 6-in. stone goes to a 24- x 60-in. Allis-Chalmers single-roll crusher which reduces it to 6-in. maximum size. This material is then recombined with the minus 6-in. stone, which was bypassed around the primary crusher, and is fed to an 8- x 16-ft. McLanahan & Stone scrubber screen for primary washing.

Crushing and Screening

A 30-in. belt conveyor then carries the stone at the rate of 350 t.p.h. to an 8000-ton surge pile, the peak of which rises to a height 60 ft. above the level of the quarry. Below the surge pile is a concrete belt conveyor tunnel. A vibrator feeder in the roof of the tunnel distributes the stone to a 4000-ft. long belt conveyor which carries it to the main processing plant at a speed of 400 f.p.m.

In the plant the stone is sent to a scalping screen which takes out the minus 3-in, stone and passes it through McLanahan & Stone log washer. Material 3-in. to 6-in. in size is first fed over a picking belt where any balls of clay are removed by hand. It is then fed to a 24- x 54-in. Allis-Chalmers double-roll crusher for reduction to a maximum of 3-in. Further crushing is done by three additional double roll crushers and a Cedarapids hammermill.

The material is then moved by belt conveyor to the screen house where a scalping screen and five Low-Head Allis-Chalmers vibrating screens produce six commercial sizes; minus 2%-in., 1%-in., 1-in., 36-in., 36-in. and 34-in. From the vibrating screens the finished sizes are sent by chutes into a battery of six 30-ton concrete silos, one for each size. From each silo, each size is loaded by gravity through a chute into 5-ton bottom-dump skip cars. The skip cars are drawn by electrically-powered hoists on narrow gauge track up inclined trestles over individual stockpiles for each size of stone. At the top of the trestle the skip car doors are tripped, and the five-ton load is added to the stockpile. Each stockpile has a capacity of approximately 50,000 tons.

Concrete reclaiming belt conveyor tunnels are located under the stockpiles. These tunnels range in cross section from 7 ft. wide and 9 ft. high to 6 ft. wide and 7 ft. high. A 24-in. Goodyear belt conveyor operates in each tunnel to the loading dock. Chutes in the tunnel roof are tripped open on signal from the loading dock so that stone may be drawn from any of the stockpiles and conveyed directly into railroad cars.

Limestone fines which are separated from the stone during the washing, crushing and screening processes are pumped to setting basins with the wash water. Two sizes of screenings are stockpiled. The coarser product is retained on a 200-mesh screen. A Bucyrus-Erie dragline with an Owen clamshell is used to load screenings from the stockpiles into railroad cars.

R. H. Mountain is plant superintendent of the entire Brooksville operation. E. B. Coppleman is assistant superintendent.

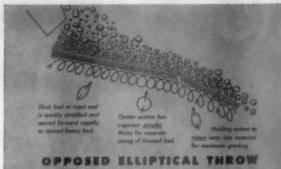
Officers of the Camp Concrete Rock Co. are: Clarence Camp II, president; J. V. Simmons, vice-president in charge of production; R. E. Austin, vicepresident for purchasing and lands; and B. M. Craig, secretary and treasurer. The Florida Crushed Stone Co., of which Mr. Camp is also president, is the exclusive sales agent for the Camp Concrete Rock Co.



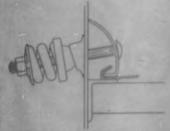
over reclaiming belt conveyor tunnel



A 5-ton bottom-dump car unloading at top of incline to storage Sizing screens and silo bins in main screening plant. Bins each have a capacity of 30 tons



Deister's exclusive powerful throw action pro capacity per square foot. Movement of mate screen is controlled accurately, for the ground efficiency in sizing.



POSITIVE SCREEN CLOTH TENSIONING

Pawerful tension springs hold screen cloth (either with hock strips or clamping angles) in totalan over series of cross members arranged in arc. Positive tension, plus curvature, prevents whipping of cloth.



DIVIDED INTERCHANGEABLE SCREENING SECTIONS

On the Type UHS (illustrated below). are identical in size; may be readily into e of screening medium. Any screen may without disturbing remaining



UNITIZED LIFETIME VIBRATING MECHANISM

Entire mechanism is precision-constructed, jig-assembled unit-demountable and readily interchangeable-and mounted well above heat, grit and dirt. Renewable res prevent wear on bearing housings and shafts. Full Oil-bath operation.



Type UHS

Features side transverse tensis Provided in 3, 4, and 6 ft. widths; 12, 14, and 16 lengths; sing

tion is keener . . . you can't afford to invest in anything but the best and most efficient equipment. And you'll need dependability too . . . a rugged screen that can produce hour after hour-day after day without downtime. These are just a few of the reasons why you should investigate Deister Screens, Remember, Unitized Lifetime Vibrating

with DEISTER If specifications are tougher . . . If competi-

Mechanism, Opposed Ellipical Throw ... these and many more now proven innovations in screen design were developed by men who specialize in one thing . . . sizing and separating equip-

And remember too, that Deister Screens are backed by follow-through service that has no parallel . . . for DEISTER top management is personally interested in the continued profitable operation of every DEISTER screen in the field.



WAYNE 4, INDIANA FORT EAST WAYNE



3 WAYS You Can Modernize Your Plant

Profitable Cement Production!

2

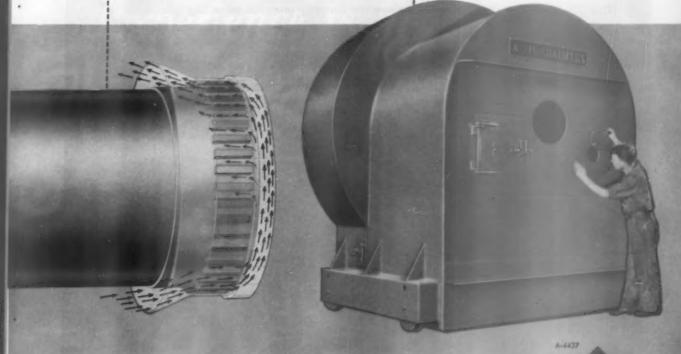
INSTALL AN AIR-COOLED DISCHARGE END

This modernization improvement will actually pay for itself in 2 to 3 years in refractory savings alone! Big savings in downtime, too, because fewer shutdowns are required to replace end brick. You gain valuable production time. An Air-Cooled discharge end helps maintain a positive air seal between firing hood and kiln, resulting in fuel savings. Discharge end distortion is eliminated. Kilns now in operation can be modernized easily with an Allis-Chalmers Air-Cooled discharge end.

3

MOVABLE FIRING HOOD

Another profitable way to modernize—an Allis-Chalmers movable firing hood will maintain an excellent air seal with the kiln, saving fuel by reducing hot air loss at kiln end and keeping out infiltering cold air. Movable design compensates for expansion and contraction of kiln shell. Allis-Chalmers firing hoods are built to use standard refractory brick lining. They're heavily constructed, to stay rigid throughout years of service, and have convenient access and inspection openings.



ALLIS-CHALMERS





Overall view of warehouse and plant alongside railroad. Track unloading conveyor and elevator to carry material into bins in right

EXPANDED PERLITE **Produced in Completely Automatic Plant**

By HUBERT C. PERSONS

COMPLETELY AUTOMATIC OPERATION of Tennessee Products and Chemical Corporation's newest perlite plant requires only six men, including the packing. The plant, situated on a bypass truck route at the northern edge of Jacksonville, Fla., is the newest of three. The company's other perlite plants are at Nashville, Tenn., and Little Rock, Ark.

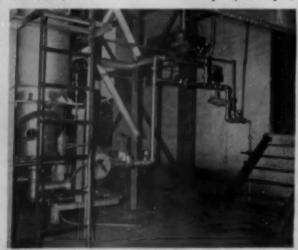
 Tennessee Products and Chemical Corp. perlite plant at Jacksonville, Fla., operated with only six men. Screw conveyors and bucket elevators simplify material handling

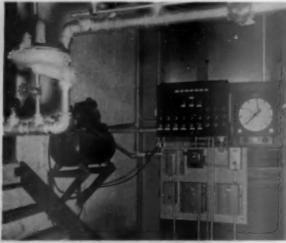
Perlite, from deposits in Colorado and Nevada, is shipped to the plant by rail in 60-ton hopper bottom cars. The ore is crushed, screened and sized at the mine. At the plant the ore is dumped by gravity into an undertrack pit from which a screw conveyor feeds into a Link-Belt bucket elevator. The bucket elevator, which has a capacity of 7 t.p.h., empties the ore into

a battery of four elevated storage bins which have a combined capacity of 280 tons.

Preheating is First Step

From the storage bins the ore is moved by screw conveyor and bucket elevator to a feeder bin which feeds it automatically into a Silbrico preheater. This is a horizontal, rotating





Vertical furness which expands perlite are to 10 or 12 times Central panel, including recording thermometer, in perlite ex-



Experience is important

. IN PLANNING YOUR AUTOMATED PLANT

AUTOMATION has been engineered into Giffels & Vallet projects for many years. Although it was then not identified as Automation by name, it did produce automatic operations of many types. Automatic shakeouts in foundries—automatic stackers in board plants—automatic surge storage between machines—and many other applications throughout industry.

Automation is but one phase of the comprehensive planning and engineering services provided by Giffels & Vallet. Rubber, Plastics, Metalworking and Cement—these are but a few of the widely diversified industries Giffels & Vallet is serving. These services are discussed in a special Planning Brochure, and a copy will be mailed upon request.

Engineers serving Industry for over 30 Years

NEW YORK CHICAGO

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Giffels& Vallet 1200

DETROIT, MICHIGAN



inclined conveyor takes perlite are from under-track happer to bucket elevator



Screw conveyor below bins and bucket elevator moves perlite ore to bin feeding preheater

cylinder 12-ft. long and 14-in. in diameter, heated to approximately 500 deg. F. This temperature drives off most of the moisture in the ore and reduces degradation due to thermal shock.

From the preheater the ore is conveyed into a Silbrico furnace, a vertical monel or stainless steel cylinder 16 ft. high and 30 in. in diameter. The furnace is direct gas-fired with the flame contacting the ore. The outside tube temperatures range from 1100 to 1500 deg. F. which expands the particles of perlite ore to 8 to 10 times their original size. Butane gas is used as fuel for both the preheater and the Silbrico furnace. Two horizontal steel tanks of butane are mounted on a concrete cradle in the plant yard, holding the equivalent of a tank car of this fuel.

From the furnace, the expanded perlite passes into a Silbrico cyclone cylinder which separates out the dust. The heavier material drops into a cooler from which a powerful fan blows it into the bagging hopper.

Bag Flattener Aids Stacking

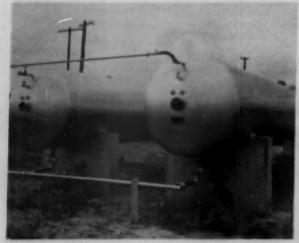
The expanded perlite, which weighs approximately 8 lb. per cu. ft., and conforms to A.S.T.M. Specification C 35-53T for plaster aggregate and A.S.T.M. C 332-54T for concrete aggregate, is packed in three-ply paper bags each holding 4 cu. ft. In order to facilitate handling, stacking and loading, the bags, when filled, are run through a bag flattener which compresses the package into a flat contour. This device was designed and built by employees at the perlite plant in Nashville, under the supervision of Virgil Cargile, and is unique in that break-down of the perlite is practically non-existent.

The finished product is marketed through building material dealers under the trade name "Tensulate Perlite." It is shipped by rail and truck into North and South Carolina, south-

ern Georgia, southern Alabama and Florida. A carload consists of 800 bags. "Tensulate Perlite" is used to replace sand in plaster and in concrete for roof slabs and roof decks, floor slabs, building block and stucco.

Joseph Welch is manager of the Jacksonville plant. Eldred Cayce is manager of the building products division of the Tennessee Products and Chemical Corporation with headquarters in Nashville. Mr. Cayce believes that the demand for expanded perlite is certain to increase as it has been doing for a number of years.

According to U. S. Bureau of Mine reports, expanded perlite has established new production records every year since 1946, the first year it was marketed in commercial quantities. That is the basis of Mr. Cayce's optimism about the future of expanded perlite. In 1953, Bureau of Mines reports showed that 79 plants in 30 states produced approximately 10,500,000 bags (4-cu. ft.) of expanded perlite.



Close-up of butene storage tanks that hold a carload of gas



Butane tanks and warehouse with railroad siding to the right



2 crawlers replaced by 1 Tournatractor

Rubber-tired unit stockpiles coal, handles quarry cleanup, plows snow

When a leading Canadian cement manufacturer tried their rubber-tired Tournatractor at their Ontario plant, they found it could handle 10 to 15% more work than the two 148 hp crawlers it replaced. Jobs taken over by 186 hp Tournatractor include building and maintaining roads, removing snow, and cleaning up around shovel at quarry pit.

Another regular task is stockpiling of coal for the plant, as it is unloaded directly from boats to lake-shore. Spreading coal with Tourna-tractor saves the manufacturer considerable capital investment since it eliminates need for installation of cranes and other fixed structures. Rubber-tired tractor makes 1-mile trip from plant to quarry at least twice per 8-hour shift, traveling job-to-job at speeds to 19 mph.

1800' dozing cycle in 3 minutes

On a typical 900-ft, stockpile dozing run, which includes dozing up adverse grades, Tournatractor completes forward and return cycle in only 3 minutes. Loads of coal averaging 3 yards are pushed in second gear (3.7 mph); return is made in high reverse (8 mph).

Coal is compacted in the normal work cycle. Big low-pressure rubber tires eliminate air pockets that cause danger of spontaneous combustion. Nearly 2 feet wide, they compact smoothly without digging ruts or grinding coal into fines.

95% efficiency on production

4-wheel anti-friction drive eliminates about 550 wearing parts of crawler track assemblies... greatly reduces machine maintenance. After 1330 hours on its busy schedule, Tournatractor records showed 95% mechanical efficiency. "We have found Tournatractor satisfactory both from an operating and maintenance point of view," says the plant manager.

Adds the foreman, "Our Tournatractor has proved satisfactory on every job we have placed it on, including stockpiling coal, shovel cleanup, snow plowing, and maintenance and construction."

If you are looking for increased production and lower maintenance,

it will pay you to investigate Tournatractor now before you replace another set of tracks. Your Le-Tourneau-Westinghouse Distributor will gladly arrange a demonstration of Tournatractor on your job.

Tournatractor "doubles" as cleanup tool at limestone pil, Rig makes 1-mile trip between stockpite and pit in about 4 minutes, Teurnatractor beats crawlers because it has the speed (19 mph forward and 8 mph reverse) and the power (pictured, 186 hp; newest models, 208 hp) to work faster.



Tournatractor—Trademork D-324-CM-b

LeTourneau-Westinghouse Company

PEORIA



A Subsidiary of Westinghouse Air Brake Co.

Prospective Chemistry of Cement and Concrete

By NATHAN C. ROCKWOOD

Part XII: The real character of portland cement and concrete

Two RECENT PUBLICATIONS should be "must" reading for those interested in trying to find out the real character of portland cement and concrete-laymen as well as the experts. The first of these is the paper by Dr. R. H. Bogue on "The Calcium Silicate Hydrates," read at the International Congress of Industrial Chemistry, Brussels, 1954, and now published as Paper No. 69 by the Portland Cement Association; the second is "An Interpretation of Some Published Researches on the Alkali-Aggregate Reaction," published in two parts (1) February, and (2) April issues (1955) of the Journal of the American Concrete Institute, by T. C. Powers and H. H. Steinour. Presumably this paper also will soon be reprinted as a publication of the P.C.A., by whom the authors are employed.

Dr. Bogue's paper is a summary of recent research on the calcium silicates prepared for the benefit of industrial chemists in other than the portland cement industry, and hence is more understandable, even by laymen, than many of his papers which were written specifically for other research men in cement and concrete. The same data are included in the new edition of Dr. Bogue's book 'The Chemistry of Portland Cement," which we reviewed in our April issue. In the book, however, the data are scattered and not so easily assimilated.

Some Elementary Chemistry

Before discussing the apparent identification of what may be called the fundamental "ailicate ion" in hydrated portland cement, it might be well to review here a few of the concepts of modern structural chemistry for the benefit of those who have not read, or have forgotten, some of the previous articles in this series. Atoms, it will be recalled, are usually considered the elemental structural units of matter, but atoms may be more or less inert, until they have parted with or gained one or more of the electrons which revolve or vibrate about the center nucleus of the atom; then they become ions of the element, rather than atoms, for the atoms are electrically neutral while the ions are positively

or negatively charged, depending on whether they have lost or gained electrons. Obviously, oppositely charged ions will attract each other and join to form jonic bonds between them.

The manner in which atoms are made to gain or part with electrons is by putting the element into solution, or by raising the temperature, or by passing an electrical current through it.

Ions need not necessarily be lone elements. There are some combinations of elements such as CO_a, SiO_a, SO_a, etc. which do not break up in ordinary chemical reactions, but act as units, and are still called ions or more specifically ionized radicals. Thus when portland cement is hydrated, the Si-O-Si bonds are not necessarily destroyed. If the silica is in a very dilute solution of lime water, or in a strong alkali solution, it is possible for single ions of hydrated silica

formed, for the H ions from the alkali solution or the water can slip into the structure and neutralize the Si—O—Si bonds between connected silica tetra-

posed Si atom or ion with the unsatisfied positive charge will then immediately take on an (OH) negative ion directly.

However, isolated tetrahedrons of either SiO₄ or Si(OH)₄ are probably seldom encountered in practical portland cement and concrete chemistry. Even if some relatively few such ions are originally formed when cement is hydrated, they have a strong tendency to join up, the process being

Si(OH)₄+Si(OH)₄=2SiO₂+4H₂O. When this happens at all four of the corners of the silica tetrahedron, the aggregation of the particles, if big enough to discount the unbonded surface ions, would result as in the formula above in SiO₂ and water. That is, presumably, the origin of some

silica in Nature, and the reason why some of this silica like opal still contains occluded water. Such newly organized silica has a very actively charged surface, since both the Si and the O ions on the surface have initially unsatisfied charges; the Si has a positive charge and takes on a negatively charged (OH) ion directly, and the O has a negative charge which takes on a positively charged H ion or some other if it is present, but along with the H ion may go the rest of an (OH) ion or a molecule of water H_sO, so that the particle of silica with its acquired surface ions may still have a negative surface charge, because of the unsatisfied charge on the exposed (OH) ion. The particle of silica referred to here may be a collodial particle in suspension in a water solution -a "sol"; or it may be a particle in a porous amorphous gel. The difference between an amorphous particle and a crystal particle is merely, as stated previously, that in a crystal the ions are organized in a regular geometric repeat pattern of lattice, and in an amorphous particle the organization of the ions is irregular. Why the artificial silicates ordinarily hydrate to gels and not to crystals is explained in the book review article in this issue (Rocky's Notes).

Calcium Silicates

Dr. Bogue, in the publication referred to above, reviews recent research to determine the structure or structures of the various calcium silicates which are presumed to be the chief binding constituents in hydrated portland cement. He writes: "The modern techniques of X-ray powder diffraction, differential thermal analysis and electron-optics have gone far to resolve this problem." Most of this research has been done with very dilute solutions of silica and lime, pure or anhydrous silicates, so that it has been possible to obtain crystals that can be studied. Extraordinary measures were taken to completely hydrate samples of dicalcium and tricalcium silicate and cement clinker. For example, "hydration of C_sS was obtained by grinding one part of C_oS with four parts of water, in a small



Here's kow 6 owners cut costs with Tournapull Rear-Dumps

Huron Portland Cement Company, Detroit, formerly used a narrow-gauge railway system for hauling shale to their mill at Alpena, Michigan. To cut costs and speed the operation, they now have 2 LeTourneau-Westinghouse Model C Rear-Dumps doing the entire job.

2,700 tons daily on 1900' cycles

In typical operation, a 3-yard shovel loads these Rear-Dumps with 18 tons of shale in 13/4 minutes. Despite adverse grades of 4 to 7% on the haul, each unit takes only 7 minutes to complete 1900' cycles. The 2 haulers regularly deliver 13 to 14 loads (234 to 252 tons) per 50-minute hour. Company records show an average production per 11-hour shift of 150 loads (2,700 tons). This is enough shale to produce 30,000 barrels of cement daily, greatest output of any mill in the world.

It will pay you to try LeTourneau-Westinghouse Rear-Dumps, too. They are available in 9, 22, 35, and 50-ton capacities to fit your job. Get facts on performance . . . price . . . and delivery. Call us any time.



CALIFORNIA MOUNTAIN QUARRY tried 1...bought 2 "C's"

Monolith Portland Cement Co, tried this one Rear-Dump; liked it so well they bought 2 more for hauling rock from the cramped quarters of their mountain-face limestone quarry. Working at altitude of 3800', each "C" carries 16 tons per load . . makes five 400' cycles every 50-min, hour,



OHIO CLAY QUARRY moves 100 tons of rock hourly

At U.S. Quarry Tile clay pit, Contractor Adolph Bockus, Canton, hauls 100 tons of overburden hourly with his 122 hp "D" Rear-Dump. Rig carries 9 to $9\frac{1}{2}$ tons per load. Haul speeds average 14 mph over a 700' haul (which includes grades up to 20%). Output, 11 trips per 50-min. hour.



INDIANA LIMESTONE QUARRY 82,476 tons for 7.6c per ton

Dunn Limestone Co., Spencer, in 6 months hauled 79,923 tans of rock plus 2553 tans of limestone and fluxing stone with 2 "D's". Total costs for 1,932 hours were \$7234 (\$2760 wages; \$3800 depreciation, insurance, taxes; \$674 fuel, repairs). That's \$3.74 per hour or 7.63c per tan hauled.



200,000-YD. W. VA. TUNNEL JOB turns where trucks can't

Bates & Rogers Construction Corp., Chicago, teamed 2 D Rear-Dumps and 2 trucks to hauf muck and shale for B. & O, railroad tunnel near Clarksburg, While trucks needed skid plate to turn inside 31' wide tunnel, "D's" made 90° turns (in 12'4" radius) and easily maneuvered under shovel.



PENNSYLVANIA COAL MINE 3 "A's" take place of 10 trucks

Colitz Coal Co., Pottsville, uses 3 "A" Rear-Dumps in place of ten 12 to 15-ton trucks. These big rigs carry 40 to 51 tons of overburden per load up 20% grades; over 2000' cycles, make about 50 trips each per 7½-hr. shift. Says Owner Colitz, "These units have cut operating costs 40%."

Tournsput!-Trademark Rog. U.S. Pat. Off. R-601-Q-6



LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

steel ball mill for eight days (15 min. of grinding followed by 45 min. of rest in each hour, keeping the temperature at or near 25 deg. C.)." By the same process it took weeks rather than days to hydrate C_oS.

Because of the obvious difficulty of completely hydrating these calcium silicates in a pure state even with a great excess of water, one cannot avoid the conclusion that not much of them is ever hydrated in portland cement concrete practice. So, while there is plenty of justification for satisfying scientific curiosity as to what a crystalline calcium silicate is like, there is a limit to how far such discoveries can be applied to concrete practice. If all the cementing or bond value of portland cement depends on a crystalline organization of completely hydrated cement particles, it must be that concrete aggregates are held together by an extremely thin application of such completely hydrated and organized, crystallized silicates.

From his review of the subject plus his own life-long research in this field, Dr. Bogue summarizes his conclusions

as follows:

"1. The interaction between calcium hydroxide and silica gel at various ratios of CaO to SiO₂ results in the formation of calcium silicates as follows:

(a) At CaO/SiO_a ratio up to about 0.8, silica gel is formed on which

Ca(OH), is adsorbed;

(b) At CaO/SiO₂ ratio 0.8 to 1.9, CSH (B) is formed, the excess Ca(OH)₂ being adsorbed or in solid solution;

(c) At CaO/SiO₂ ratio above 1.9, C₂SH₂ is formed. Mixtures of the above products or further adsorption complexes are indicated under various conditions of the operation.

"2. The composition of the calcium hydrate resulting from the complete hydration of C₂S and C₂S in a ball mill is best represented by the formula C₂S₂H₃, which is that of the mineral as willite. X-ray and electron-diffraction data obtained from C₂S and C₂S hydrated as a paste indicate a structure resembling tobermorite [CSH(B)], but there is reason to believe that this structure is a metastable polymorphic form of the same calcium silicate (C₂S₂H₄) that, in its stable form, is represented by afwillite.

"3. The structure of the low-temperature calcium hydrates CSH(B) and C₂SH₂ is best represented as consisting of chains of silicate ions [SiO₂(OH)₂]", extended in the form of fibers separated by the repeat distance 3.65 or 7.30A [Angstrom units]. The formula could be written:

Ca[SiO₀(OH)₀] [Ca(OH)₀] x [H₀O] y This formula provides that water is a part of the anion [OH] and that Ca(OH), may enter the molecule between layers of CSH.

"4. The CSH (B) appears to form thin sheets, and the C_aSH_a to form sheaf-like bundles. The ultimate product appears to consist of spherical particles of 50 to 200 Å in diameter which coalesce into disk-shaped clusters of some 1 to 3 microns in diameter. In this coalescence of the colloid micells we envision a model of the cementing action that occurs in the hydration of portland cement."

The hydrate CSH (B) is one in which the ratio of lime to silica is from 1 to 1.5 with water 1 to 2.5. The long sought "silicate ion"—the presumed building unit in hydrated portland cement—is thus accepted as [SiO_a(OH)_a]^a—with two negative charges which presumably attach or bond to it the one calcium ion and an extra molecule or more of hydrated lime—Ca(OH)_a. Since the calcium ion apparently can be attached or bonded to the SiO_a only through the unsatisfied O ions, the structural for-

in a letter to us in answer to an inquiry, Fred Ordway, acting director of the P. C. A. Fellowship at the National Bureau of Standards, who has given especial attention to the structural chemistry of the calcium silicates, writes as follows: "The ion [SiO₂(OH)₃]²", for instance, is perhaps a representation of a structural unit which may be in the material, but the formula does not represent the relations of this unit with the other units, or even the positions of the atoms within the unit itself.

He continues: "I have my doubts about it being possible to represent the three-dimensional structures of materials like this in any kind of a two-dimensional diagram. In the actual structure, of course, we expect calcium to be surrounded by 6 to 8 oxygens and silicon by 4 oxygens at the corners of a tetrahedron. I think the formula means that there is a framework of some kind composed of equal numbers of Cas+ and [SiOa(OH)a]sions, to which the additional Cas+ and (OH)1 ions and HaO molecules can attach themselves in positions that are fairly definite, but that produce a spatial relationship of the Ca2+ and (OH)1- ions resembling that in calcium hydroxide Ca(OH) a.

He continues: "Although it is always true that the calcium ion tends to surround itself with negative ions, in the case of our materials the negative ions are oxygen ions, which may or may not be bonded to some other atom to form some more complex negative ion. These more complex groupings may be silicate ions or hydroxyl ions, or even water molecules. Whether hydroxyl jons or water molecules would be incorporated preferentially in the structure when crystallization takes place must probably depend on how well the positive charges of the calcium ions are balanced by the negative charges of other anions than the hydroxyl ion. If some other ion, such as chloride, sulphate or nitrate is present to balance the charges, then the calcium ion may be satisfied by an environment of neutral water molecules."

In conclusion Mr. Ordway writes: "To find out the real mechanism by which crystallization takes place we will have to know the nature of the structural units that are actually available in the solution. I don't think that these facts have been very well established up to now. Attempts to determine the structures of the crystals involved, of course, are being carried on with considerable success, particularly in England. When all the difficult problems of the solid material have been solved, then the obvious step is to go on to the more difficult question of the mechanism by which they are produced. I hope that cement researchers will be making important forward steps in understanding this mechanism within a few years.

Some Speculations

With that warning, we have no right to speculate as to what the calcium silicate "ion" Ca[SiOs(OH)s] really signifies, but since Ca is always coordinated (or surrounded) by six O's in lime and with 8 in natural silicates, and with 6 (OH) ions in calcium hydroxide, it would seem that the Ca attached to the ion [SiO₂(OH)₂] can only be unhydrated lime. Dr. Bouge's paper which shows an electron micrograph and an X-ray diffraction pattern of the same particle of CoS partially hydrated seem to bear out this supposition; for while the electron micrograph shows amorphous particles of gel, the core of one of these particles shows the crystal structure of anhydrous C.S. It has been proved before now that neat CoS in setting and hardening does not have to be completely hydrated to develop its full strength as a binder or cement. The unhydrated part or core of (anhydrous) silicate evidently becomes sealed in an envelope of hardened gel and is subsequently hydrated very slowly or not all.

Again we are reminded of our previous speculation that the function of the lime in anhydrous tricalcium and dicalcium silicates, and in port-

(Continued on page 168)

Cost Per Ton Broken Cut 58%

Drill	Bit Size	Rock	Feet per Shift	Cost per Ft. Drilled	Cost per Ton Broken
Rotary Drill	6-1/8 & 7-3/8	Average & Hard	110	0.95	.053
Bucyrus-Erie 50-R	9-7/8	Average & Hard	145	0.76	.022

with 50·R Rotary Drill

Records of drilling performance and costs for two rotary drills, working in a quarry operated by a large cement company in the Far West, revealed this remarkable performance record for a 50-R drill — a reduction of 19 cents per foot drilled; a 58% reduction in the cost per ton broken!

This is just one of many case histories which are proving the drilling superiority of the 50-R daily. Behind performance like this are these outstanding features:

★ Ward Leonard electric control on rotation of drill pipe permits drilling at most efficient speed for a given formation.

- ★ Pulldown force is hydraulically powered for maximum controlled penetration.
- ★ Machine drills continuously for 32-¾ feet before an additional drill pipe section must be added.
- ★ Remote-controlled power-driven tool handling unit permits drill pipe sections to be added or removed in a few minutes and without heavy manual effort.

For a complete rundown of all important 50-R features, write today.



South Milwaukee, Wisconsin



ROTARY KILN Its Performance and Development

Part 6: An effective lime cooler

By VICTOR J. AZBE*

No LIME RILN PERFORMANCE can ever prove satisfactory without a completely effective lime cooler. It is also basic that no lime cooler, unless of very high air velocity and of direct contact air-lime type, can ever be satisfactorily effective. This rules out all types of planetary coolers, all grate type coolers and any low velocity contact cooler. Some of these coolers now perform what one would call "Fair." But that is only because the kiln is inefficient, and there is little lime to cool and much air to cool it with. A cooler, which apparently will function fairly well at 9 million B.t.u., will cease to function at 5 million or even sooner unless of the right type.

Supposing the lime discharge temperature is 2200 deg. F. and 70 percent of the air passes through the Pres. Ashe Corporation. fit. Louis. Mo.

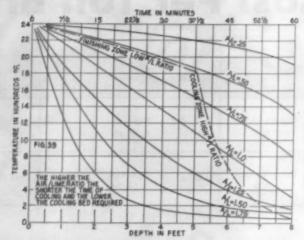


Fig. 39: Probable temperature gradients of lime in cooler for varied air-lime ratio

cooler in each case. Then as shown in Fig. 37, at 9 million B.t.u. per ton and 60 percent cooler efficiency, air temperature will be 600 deg. F., at 9 million B.t.u.; at 90 percent cooler efficiency it will be 870 deg. F., and at 5 million B.t.u. and 90 percent efficiency, considered possible under our concept, the resulting air temperature will be 1440 deg. F. and almost up to the calcining temperature level.

Attainment of high efficiency is not a straight line function. Thirty percent is easy; anything better becomes ever more difficult, the effort required increasing as a rapidly mounting curve. It is for this reason that no

cooler will be efficient unless it is a contact cooler; heat transfer rate will be too poor, cooler too massive, radiation loss too great and the lime imperfectly cooled. Even a contact cooler will not do well unless the air velocity is high.

The effect of air velocity on the heat transfer rate is portrayed by the very important Fig. 38. One may have a contact cooler operating at an air velocity of 3 ft. per sec., but the heat transfer rate would be only 2.9 B.t.u./sq. ft./hr./deg. F. Or, at a velocity of 26 ft. per sec. in which case the heat transfer rate would be 13.8 B.t.u./sq. ft./hr./deg. F. The latter cooler would

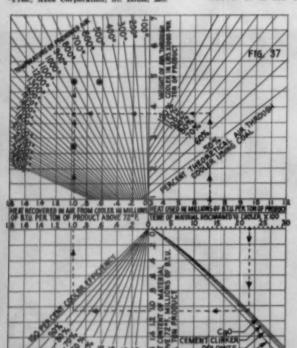
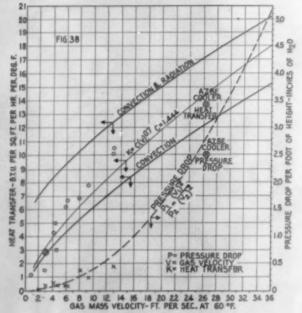


Fig. 37: Lime and clinker cooler performance charts

Fig. 38: Relation of heat transfer and draft drop rate to gos mass velocity through the cooler



NEW SILCO-FIEX MOTOR INSULATION

Offers These Amazing Physical Properties

• Flexibility and Resilience — Silco-Flex insulation remains flexible and resilient indefinitely. It is especially resistant to mechanical abuse and to stresses of overloading, rapid starting and stopping.

● Moisture Resistance — Completely sealed, Silco-Flex insulated coils are the most moisture-resistant commercial coils ever produced. They are production-tested while submerged in water . . . by far the most complete and searching high potential test used.

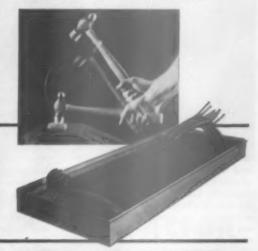
● Abrasion Resistance — Samples of insulation at right show effects after sandblasting with 90 grit aluminum oxide and 100 psi air for one minute. Nozzle-to-sample distance was six inches, thickness equivalent to 2300-volt insulation. Note difference in abrasion!

● Homogeneity — Silco-Flex insulation is a void-free dielectric barrier vulcanized into a unified insulating wall. It maintains its homogeneity under extremes of differential expansion and contraction due to thermal cycling.

Other Advantages include exceptionally good thermal stability and chemical inertness. Silco-Flex insulation is also a much better heat conductor than ordinary electrical insulating materials. Moreover, enclosures now required to protect windings from moisture and abrasion may be eliminated in many cases.

Allis-Chalmers, working with Dow Corning Corporation, has developed Silco-Flex motor and generator insulation . . . truly new in concept . . . truly new in effectiveness.

Silco-Flex insulation employs a pure silicone rubber combined with specially developed application techniques to produce an insulation unmatched by any other in use today.





Silco-Flex Insulation

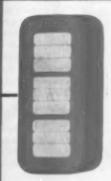


Polyester Mice Tape



Asphaltum Mica Tape

New Silco-Flex insulation is immediately available for all Class H form-wound coils and for Class A and B windings operating under selected service conditions. For complete information, call your Allis-Chalmers representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.



Silco-Flex is an Attis-Chalmers trademark.

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AC ALIS-CHAMAES

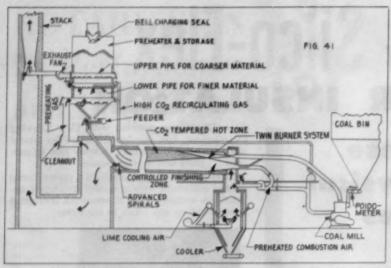


Fig. 41: Old Azbe system of rotary kiln arrangement

be only one fifth the size, more positive in its material and gas flow and of far lower radiation loss.

The cooling rate in time, or in cooler bed height depends on the size of lime, or maybe better expressed as the surface that it presents. It depends on the air velocity, and also on the air-lime ratio indicated by Fig. 39 which reveals that cooling is easy in case of inefficient kilns and quite difficult in the case of efficient units. Unless all requirements are satisfied, the kilns will not be efficient. It is more important to cool when lime-fuel ratio is high than when low and more difficult.

As far as we know we were the first to design a direct contact cooler. It was for the Gager Lime Co. in about 1935. We undoubtedly were first in designing a high air velocity cooler, shown in Fig. 40.

This high air velocity cooler was installed at a plant in British Columbia on a rotary kiln calcining high calcium lime and fired with gas produced from water saturated wood. This in-

CLEANOUT OPENING

NISPECTION DOOR
HAMICWHEELS

COOLER

DUST
HOOD
REDULER WITH
HAMICWHEELS

PAN CONVEYOR

PAN CONVEYOR

Fig. 40: First Azbe high air velocity cooler

stallation was made possible by burning a very lean gas with preheated air. The system was simple and, for a low capacity kiln, effective. Another system of cooling, as well as of preheating, was installed in 1942, Fig. 41. The cooler was arranged for side air introduction and was equipped with a dust interceptor. For the purpose of preheater gas introduction and withdrawal, pipes were used that were similar to those installed on vertical kilns since 1929. A double burner is also featured. In more recent years, the cooler and also other features of the kiln became more highly developed.

Labor Relations

(Continued from page 51)

the company, but rather only of the type of work performed. Whether it was because of the relative frequency of such brake failures, the fact that there were no plant safety rules stating in general or in particular what should be done when such mechanical failures occurred, or for some other reasons, when such brake failures occurred the equipment wasn't left by the employe for supervisor to assume control and responsibility. Rather, it was driven back to an appropriate place. The company apparently concurred in that practice, for at the hearing it stated that the employe either should have left the truck or he should have driven it in a manner appropriate to its conditions. In the absence of any plant safety rules in point or any stated company policy, and in the light of past practice in this regard, it is doubtful that an employe in such circumstances really has an effective

"In this case there was a continuation of past practice. Under these

circumstances the company could expect that the truck would be driven with due regard to its condition. But that does not mean, as the company implied, that the company may require the employe to become a kind of insurer against accidents. For example, suppose that while this truck was driven with due regard to its condition some one suddenly ran into the road and was struck; suppose also that if the brakes had been in order the accident would not have occurred. Certainly the employe could not be held responsible for paying any fine assessed because of the accident. In this case, the employe driving the truck approaches an intersection where he had to yield the right of way. He knew he had to yield the right of way for at least some distance before he reached the intersection and he knew also that he had no brakes. Yet he entered the intersection at a rate of speed which carried him beyond the center line where he sideswiped a car going in the opposite direction. He was fined for the accident. It is clear that the employe did not exercise reasonable care under the circumstances; therefore, there is no reason, in this case, to disturb the company's policy not to reimburse employes for personal violations of the traffic laws.

"The driver voluntarily continued a practice of not leaving a truck when its brakes failed. The company has no right to rely on the continuation of such practice which does endanger the safety of employes. It is not necessary, I think, to elaborate the possible conflicts which could result if employes unilaterally refuse to operate equipment which they believe to be in poor mechanical condition. Appropriate plant safety rules and machinery for the administration of such rules appear to be the only solution to avoid such possible conflicts.

"The grievance is denied."

Publishes Building Codes

THE AMERICAN SOCIETY FOR TESTING MATERIALS has published "Compilation of A.S.T.M. Standards on Building Codes"—a 950-page document bringing together more than 250 A.S.T.M. specifications, methods of test, and definitions included by reference in the major building codes of the United States and Canada. Cement, gypsum, ready-mixed concrete, building units, reinforcing steel, and similar construction materials are covered in the report. Price: \$6.00

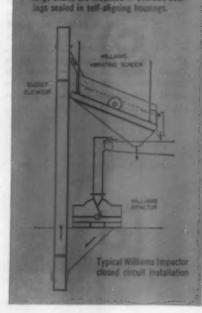
PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., has opened a new building materials yard in San Mateo, which will be under the management of A. M. Sperry.

Lowest-Cost Crushing

with better product control



Open view showing hammers and impact blocks. Extremely rugged, heavy construction of steel plate with manganese steel liners, hammers and impact blocks. Extra large shafts are mounted in oversize bear-



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Helix-Seal Mills Roller Mills Air Soy

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD.



Laft to right: Robt. M. Koch, executive secretary, N.A.L.I., Mrs. John H. Riddle, and John H. Riddle, Riddle Quarries, Inc., Salina, Kan., president of the association

 National Agricultural Limestone Institute, mid-year board meeting, discusses state agricultural conservation programs, promotion, and marketing problems of industry

Agricultural Limestone Association Considers Stone Testing Service

THE MID-YEAR BOARD MEETING of the National Agricultural Limestone Institute was held in Cleveland, Ohio, June 9 and 10. There were 66 directors, committeemen and wives in attendance.

The first day's function included a morning executive committee meeting, a luncheon of all directors and committeemen, afternoon meeting of 17 committees and an evening session of all committees.

Subjects discussed at a three-hour joint committee meeting included various requirements of State Agricultural Conservation Programs, aglime promotion, local marketing problems, individual company sales experiences and the general outlook for agricultural limestone in the immediate months ahead. One of the principal points of discussion was the mandatory soil test requirement still in use in many states. Robert M. Koch, executive secretary of N.A.L.I. was the meeting moderator.

Many producers felt that development of the soil test represents progress in American agriculture, but that no such test had yet been devised which could meet any and all objections. The opinion of this group was that although soil tests are very useful as an educational tool and often extremely helpful in selling agricultural limestone, such tests should be kept in the educational sphere and not made a mandatory feature of any state program.

It was brought out that many states have already eliminated the mandatory soil test and now permit some alternative in the application of agricultural limestone. Generally, producers from these states attest that their tonnage is increasing this year while others in the still restrictive states are experiencing no increase.

Some producers felt that the decline in net farm income in recent years was a major factor in the drop of agricultural limestone sales in many states. It was the consensus of the group that the limestone industry's position with respect to mandatory soil testing as expressed through N.A.L.I. was a sound approach and the fact that 16 states have now dropped the mandatory feature of their state programs indicate that many A.C.P. officials feel that this approach has much merit.

Propose Stone Testing Service

The Board of Directors heard committee reports and recommendations were made to the Board and appropriate action taken. Of particular interest to the board and to all N.A.L.I. members, and in fact to all crushed stone producers, was the report of committee chairman, Robert M. Pat-

ton, president, New York Coal Co., Columbus, Ohio. Mr. Patton's committee had been appointed at the board meeting last January to explore the possibilities of combining efforts in the crushed stone field with the National Crushed Stone Association. Many N.A.L.I. members had for some time past expressed the desire to have some service in the crushed stone field—a service which could be supplied by a trade association. It was thought that by combining some of the activities of the N.C.S.A. and N.A.L.I., this service could be provided.

Mr. Patton reported that his committee met with a committee from N.C.S.A. on April 21 in Cincinnati to explore this situation. Some had thought that some structural combining of the two organizations might result but this thought was not considered favorably by the N.C.S.A. committee. According to Mr. Patton's report the N.C.S.A. committee felt that a permanent standing committee could be appointed by each organiza-



Left to right: Horace C. Krause, Columbia Quarry Co., St. Louis, Mo.; W. S. Black, Black White Limestone Co., Quincy, III. and Earl L. Heckathorn, Stuntz-Yeoman Co., Delphi, Ind.



Relief... for a production pain

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for example: If you're having trouble with your chain drives, Rex Chabelco® Steel Chains are your answer. These rugged chains are designed and built for the toughest service, especially where dust, dirt or heat is a problem. They stand up under heaviest loads...transmit more h.p. per dollar.

for example: If maintenance is your problem, here's a suggestion. Use Rex Split Hardened Rim Traction Wheels and Sprockets. Just install the body, then each rim segment. Replacement of rim section can be done without removing the chain. Down time can be reduced with these long-wearing traction wheels and sprockets.

Whatever your needs...drive chain, conveyor and elevator chain, complete elevators, belt conveyors, feeders, roller bearings, buckets or sprockets, you'll relieve those production pains by looking to Chain Belt. See your local Field Sales Engineer or write direct to Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.

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Dust got their goat at Amalgamated!

Pangborn rids plant of goatskin dust, gets higher production at lower cost.

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ery maintenance costs are lower. No wonder Amalgamated says Pangborn is "really doing a job"!

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tion to meet from time to time on problems of mutual interest. N.A.L.I.'s Board adopted this suggestion.

The joint committee meeting in April considered the problem of providing services on crushed stone laboratory testing to those members of N.A.L.I. who are not receiving such service. The N.C.S.A. committee stated that it could not provide this service. The N.C.S.A. committee expressed the opinion that if N.A.L.I. members want stone testing services or other services in the crushed stone field they are free to join N.C.S.A. However, the N.A.L.I. committee pointed out that there are basic differences between the two organizations which is probably responsible for the fact that more N.A.L.I. members did not join N.C.S.A. For example, N.C.S.A. does not believe in lobbying and promotion activities while N.A.L.I. does.

Mr. Patton's committee recommended that a committee be appointed to act as a standing permanent committee to cooperate with N.C.S.A. on mutual problems to explore further the matter of servicing N.A.L.I. members in the crushed stone field. In addition it was recommended that a committee be directed to conduct a survey of all N.A.L.I. members to determine their thoughts on increased services in the crushed stone field. Members of Mr. Patton's committee meeting with the N.C.S.A. committee in Cincinnati are: Leonard S. Fry, president, Fry Coal & Stone Co.; William E. Hewitt, sales manager, East St. Louis Stone Co.; Clarence A. Munz, vicepresident, Eastern Rock Products Co.; and R. T. Willingham, Willingham-Little Stone Co. The new committee named to conduct the survey is composed of Leonard S. Fry, chairman; William S. Black, vice-president, Black White Limestone Co.; W. D. Dillon, president, Dillon Stone Co.; Russell W. Hunt, president, Southwest Lime Co.; and J. B. Mount, secretary-treasurer, Maymead Lime Co.

Change Convention Dates

The Convention Arrangements Committee followed the suggestion that N.A.L.I.'s annual convention be moved closer to the N.C.S.A. convention in order that N.A.L.I. members could take advantage of the machinery show. Although N.A.L.I. had already set its dates for the 1956 convention, the committee explored the possibility of changing and arranged with the Blackstone Hotel in Chicago, for the N.A.L.I. convention of 1956 to be held February 13 through 17.

These dates will run concurrently with the National Sand and Gravel Association Convention, and immediately before the N.C.S.A. convention

(Continued on page 178)

How many hundred dollars will this ad save you?

How much do you spend each year to

Be sure to include the labor needed to make each change. And don't forget loss in production while your plant is shut down for repairs.

replace elevator chains and sprockets?

Now figure the money you'd save by using a chain that outlasts ordinary chains 2 to 4 times. That's what you can expect from the improved KENKROME No. 844 Heavy Duty Elevator Chain shown above!

KENKROME is no ordinary steel . . . in fact it's no ordinary manganese steel. There's no other steel quite like it.

Addition of special alloying metals under a patented process, plus Kensington's own scientific method of heat treatment, have created this remarkable metal which defies wear by developing surface hardness under impact to better enable it to withstand abrasion. Beneath this continually hardening surface, the metal always remains tough better able to withstand shock than are metals that are hard all the way through.

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of the metal itself. They redesigned the physical characteristics of the links. Note, for example, how the extra-heavy 1 ¼" pin is held in place. Even in those rare instances when a pin does break, it can't fall out, for on one end a cotter pin fits over its head, and on the other, a cotter pin passes through both pin and extended boss. Pins have T-head so

they may be reversed. They fit link holes

that are drifted to close tolerances.

Links are extra heavy . . . heavier than

in any other No. 844 built.

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Both K-2 and K-4 links are shown at the left. When wide buckets ere used, Kensington's special 4-hole K-4 makes it possible to use one strand instead of two ... and that single KENKROME chain will be stronger than two ordinary No. 844 chainsl



The Renewable Tooth Sprocket is another example of Kensington's improved design. Tooth segments can be replaced by two men during lunch hour without even removing the chain! And a new set of teeth costs but a fraction of what you'd pay for a complete one-piece sprocket.

KENKROME Chains and Sprockets are built to fit all standard conveyors and elevators used in rock, gravel, and cement plants. It will pay YOU to Switch to KENKROME!

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ZONE STATE CITY -------

SAFETY - A Top Management Problem

By C. A. GUSTAFSON*

 Management should take an active interest in acquiring safety equipment, and seeing that safety rules are followed and accident hazards are removed

E VERYONE HAS HIS OWN DEFINITION for safety. Take 50 people and you will get at least 40 different ideas. One will say "Don't touch anything electrical; get an electrician;" another, "Drive carefully and heed all signs, lights and warnings;" the third, "Don't go without rubbers on a rainy day or you'll get pneumonia."

Actually, safety is all this plus the other 47 answers as well. The author thinks of Safety and Accident Prevention as synonymous, and accident prevention can mean only one thing: "Stop an accident before it happens."

The quarry industry for years has been classified by all agencies as a "Poor Risk." Why? Because the overall accident tabulation has found quarrying second or third from the bottom of about 60 basic industries. This tabulation is from the National Safety Council, and as such certainly can't be disputed.

"Can anything be done about this?," is certainly a logical question. Yes! We can and are doing something about it. In 1951 and 1952, ten men were killed each year in member companies of the National Crushed Stone Association. In 1953, only four were killed, and in 1954 none were killed through accident.

How was this astounding record accomplished? Was it through the Accident Prevention Committee of the Association? Were men more safety-conscious? Did top management give more cooperation?

I believe it was a combination of all three that made this record possible, but of them, certainly top management deserves the biggest credit. Because if a safety program was not acceptable to "The Brass" there wouldn't be any safety except what would be enforced by state, insurance or union agencies.

Strangely enough, when the rank and file of workers know and understand that management is for safety and wants the plant to be a safe plant, they will go to great lengths to make it so. No good foreman will knowingly go against the wishes of his boss, and likewise, no good worker will go

against the foreman. It runs almost the same as "chain of command" in the military.

Management certainly has been made aware by various agencies of the importance of safety, not only from a humanitarian standpoint but from the possible savings accrued on lower compensation premiums as well as increased production. Through the reports received by me as editor of the Monthly Accident Review, I have become aware (especially the past year) of suggestions and ideas to prevent similar accidents stemming directly from management. I know these companies only as code numbers, but it is indeed gratifying to find our quarry managements actually digging into the causes and cures of accidents.

There are certain companies (not only members but many more nonmembers) who have still a large number of accidents. One particular nonmember quarry has had five fatal accidents in the past two years. Top management screams for safety (due possibly to high compensation rate) but yet only gives lip service. Lip service isn't enough. Action is called for. This outfit is a family-owned affair, and I'm sure this loss of life (to say nothing of other non-fatal accidents) can be stopped immediately if the president of the concern called in the foreman and laid it on the line. Remember, "Safety is No Accident," and if one quarry can cut accident rates year after year, others can as well.

Top management must of course authorize the purchase of safety equipment. This not only includes personal safety gear, but safety belts or harnesses, mechanical lifting devices, starters on hand-cranked engines, and a host of other equipment. Management should not be frightened at the above, because of necessity everything cannot be purchased or installed at once. Lay out a program to purchase such equipment over a period of time. and gradually eliminate accidents as any production bottleneck would be. Good housekeeping is perhaps the cheapest and easiest way to start. Certainly if management criticized a foreman for poor housekeeping a few consecutive times, the foreman would very quickly decide to not only clean

up his department but would see that it was kept clean.

Management is always concerned with profits and losses. Compensation premiums are levied directly on management for past experience. Consequently each accident costs the employer something. This "something" is a direct loss, not only in actual dollars, but in loss of production, cost of replacing skilled man, but perhaps added maintenance cost due to untrained man not having proper experience. These are but a few of the indirect costs among a host of others. Wise, cost-conscious management certainly spark-plugs the safety program.

In many plants top management makes a serious effort to attend plant safety meetings. This is not only a good employe relations gesture, but gives such a company officer a direct insight into problems usually unsuspected by him. At this time, too, he can re-state company safety policy as well as assure the men first-hand the Safety—A Top Management Problem

A deplorable mistake management often commits is to lay down safety rules and disregard them when they enter hazardous areas. I visited a large quarry in central New York some time ago and was extremely pleased to see a hard hat on the vice-president's desk. When I spoke about it, he said in part, "It's not for show on my desk; I wear it every time I go into the operation." The hat certainly looked it, as it not only was coated with quarry dust but had a noticeable dent on one side! On entering the operation I was impressed with the number of hard hats worn. I don't remember having seen one man without one. It is no wonder this plant receives a safety award nearly every year.

Top management therefore can either make or break the safety program, and it is to their interests to "make it." One accident can pay for all the hard hats and goggles needed by the plant for years. One back injury can pay for dozens of mechanical lifting devices, and in our industry back injuries are the most prevalent. Top management always finds the answers to production and sales problems, and they can do the same with safety problems.

^{*}Supt. Sussex Quarries, Inc., and chairman, Accident Prevention Committee, National Crushed Stone Association.

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5 17-

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Your Blaster is well off the rock pile. He's all set to shoot the big chunks wherever they lie. Each hole is primed with fuse and cap, and the fuse has been hooked up with Quarrycord.

Ensign-Bickford Quarrycord is a flexible, water-resistant cord which burns with an external flame at the rate of about one foot per second. A connector, crimped on the free end of each fuse, provides a positive connection for the Quarrycord.

Notice that the hook-up employs cross connections at fairly close intervals. This is done to get the fire there faster — to make sure that each safety fuse is ignited in time to burn below the collar of the hole before the first charges fire.

Now you can do your Secondary Blasting in one operation without causing one big blast. You can fire when ready, from a point of easy retreat. Quarry-cord is not affected by stray electrical currents.

and here's the Hook-up!



(PLEASE GIVE THIS ADVERTISEMENT TO YOUR BLASTING FOREMAN)





INFORMATION

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TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

- ADJUSTABLE SPEED DRIVE General Electric Co. has brought out Bulletin CEA-6234, on the general purpose, full-wave, Thymo-trol adjustable speed drive. Typical application photographs, operation data and construction feetures are given.
- 2 AIR-LINE LUBRICATORS IngereeliRand Co. has issued Form 4169, describing and
 illustrating air-line lubricators for use with
 small hand-held air tools up to large quarry-type
 drills. A cross-sectional illustration shows construction details. Specifications, selection table,
 and a table giving physical and chemical requirements are included.
- BUCKET LOADER SHOCK-ABSORBER— Greer Hydraulics, Inc., has published Bulletin 1200, describing the advantages of the Greer Accumulator, a hydraulic component providing shock absorber action for use on bucket loaders. A schematic illustration shows installation de-
- 4 CABLE SPLICING TAPES—The Okonite Co. has issued Bulletin 5505, giving details and application instructions for its Vulcaniser tapes, including rubber insulation, rubber sheath and colored neoprene sheath tapes. A curing time table and cross-sectional cable drawings are also gives.
- g CEMENT BOX—Drave-Doyle Co. has issued specifications and construction data on the Cem-Matic cement box in Bulletin 1601. A line drawing and installation details for use in betching operations, are included.
- 6 CONCRETE PIPE HANDLING—Towmotor Corp. has announced "Certified Job Study No. 142," describing the handling operation at United States Concrete Pipe Co., which utilizes two fork lift trucks, the Model LT-60 with pneumatic three, and Model LT-72 with 10,000-lb. canacity.
- 7 CONCRETE PLANTS—The C. S. Johnson Co. has published a bulletin giving suggestions for planning concrete plants for central-mix, transit-mix and concrete products. Seven basic steps are given, and typical plants illustrated. Various type equipment is also described and illustrated.
- CONCRETE WATER REPELLENTS —
 Meduse Portland Cement Co. has brought out
 an eight-page brochure, A.I.A. File No. 3-A-10,
 giving complete specifications on concrete waterrepellents. Directions are given for use on bonded concrete Boor finish, portland cement stucco,
 and existing concrete work.
- ONVEYOR BELTS—The B. F. Goodrich
 Co., Industrial Products Div., has issued a data
 sheet on the "Riffis Grip" conveyor belt and
 special conveyor belt constructions, including
 wire-inserted belts, turnsble conveyor belt,
 belts with sepped piles, reinforced covers and
 fisages.
- 10 CORE DRILLING MACHINES—Sprague and Henwood, Inc., has prepared literature describing and illustrating two diamond core drilling machines, Model 30 and Model L-2. Specifications and working data are included.
- 11 CRAWLER TRACTORS International Harvester Co. has released a 30-page, illustrated booklet listing recent improvements made in TD-24, TD-18A, TD-14A, TD-9, T-9, TD-6 and T-6 crawlers. It also lists and illustrates recently added equipment in its line of tractors, crawlers, bulldosers, etc.
- 12 CRUSHING-SCREENING PLANT—Dismond Iron Works, division of Goodman Manufacturing Ca., has issued Catalog D-103, describing and dilustrating its single pass, portable, crushing and accessing plant. Specifications, typical application photographs and a list of its features are included.

- DIAPHRAGM PUMPS Deaver Equipment Co. has amsounced Bulletin P8-B9, elescribing and illustrating adjustable stroke disphragm pumps and their service in various
 fields. Included are photos, data and a series of
 drawings explaining the construction, mechanism and capacity of the pumps.
- DIESEL POWER UNIT—International Harvester Co. has prepared a booklet describing the UD-525 diesel power unit, which develops 115 hp. at 1800 r.p.m. Specifications, performance charts, and a listing of available attachments are included.
- 15

 RARTH-MOVING—Twin Disc Clutch Co.
 has brought out Vol. 17, No. 2 of "Production
 Road," giving the history of earth-moving pregress, and how Allis-Chalmers, Caterpillar and
 International have brought efficiency of torque
 converter drive to ipsent work.
- BLECTRIC VIBRATORS—The Cleveland Vibrator Co. has issued a catalog, No. 11, describing its line of electric vibrators, giving assections and prices. It covers eccentric weight vibrators and electro-magnetic vibrators. Action photographs, mounting and installation data, and information on vibrating tables and presumatic vibrators are given.
- 17 ELECTRODES—Alley Rods Co. has released Bulletin AR-10, a selection guide for Arcatoy stainless steel electrodes. Typical chemical analysis and physical properties are given, as well as a table of current ranges for stainless walding.
- 18 FEEDER—Omega Machine Co. has issued Bulletins 37-M1 and AR-8, on the "El-Weigh" belt gravimetric feeder for continuously feeding dry materials at medium to high rates. The "lisea-A-Gram" controller for precise propertional correction is also described. Dimension drawings and photos are included.
- 19 FILTRATION—Johns-Manville has released a 12-page, illustrated brochure entitled "Get Perfect Clarity with Celite Filtration." It explains the use of distomite filters in removing colloids and suspended impurities, and describes typical installations.

- FLEXIBLE HOSE—The Flexaust Co. has issued a set of bulletian, Nos. 40, 41, 42, 43, 44 and price lists, giving data on the design, installation and purchase of Sectible hose for dust and fume control, air conditioning and materials handling. Also included in general information, accessories, application, friction loss, etc.
- 21 FLOW METERS The Hays Corp. has insued Publication 55-1074-222, describing and illustrating electronic flow meters with a choice of several mercury-less transmitters for measurement of differential pressures, liquid level, fluid, gas air of steam flow, temperatures and pressures.
- 22 HIGH-VOLTAGE MOTOR CONTROL—
 General Electric Co. has announced Bulletis
 QEA-6331, outlining the features of the highvoltage, current-limiting, fused starters for ecordinated control of squirrel-cage, synchronous,
 wound-roter and multi-speed motors. Installation and space requirement details are also inituded.
- 23 LOADER—Seaboard Equipment Co., Inc., has issued a four-page brochure describing the Merten Overloader. Elizatrations, application augmetions, performance reports, optional equipment and specifications are included.
- LOADERS—Central Chic Steel Products
 Co., Austin Division, has published five catalog
 specification sheets covering the complets like
 of Austin Overshot Loaders, Models 2-C, 4-C,
 6-C, 7-C and 8-C respectively. Action photographs, filterations of evallable attackments,
 dimensional drawings and condensed specifications are given.
- 25 MINING LAWS State of California, Division of Mison, has published a reprint of a 78-page guide to California missing laws, entitled "Legal Guide for California Prospectors and Misons," containing information of a general nature for those wishing to establish rights to a new minoral discovery, or to maintain rights on an olready established eas. It is available at a cost of 25¢ plus 3 percent esize tax from the Division of Mison, Ferry Suliding, Sen Francisco 11, Calif.

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USE COUPON BELOW

- MAGNETIC TRANSMISSION EQUIP-MENT—Stearns Magnetic, Inc., has published Bulletin 226-D, covering the standard of mag-netic brakes and clutches. Included are selec-tion data and specifications of magnetic brakes for re-rated N.S.M.A. frame sizes.
- MINIBO TOOLS Vascoloy-Samet Corp. has brought out a catalog covering mining tools such as chain cutter bits, roof drill bits, negatiful bits, percuedant bits, carbide blanks for percussion bits, etc. A chart is also lactuded showing practical uses and recommended drill steels for percussion bits.
- MEEDLE BEARINGS—Torrington Co. has released a 76-page catalog, No. 55, giving design, application and use data for five types anosedie bearings. The catalog is organised for practical use in properly selecting bearings by type, sine and suitability. Included ore numerous takins, line drawings and engineering data. 28
- OVERHEAD CONVEYOR TROLLEYS. Link-Bett Co. has brought out a 20-page cata-ing. No. 2836, describing a new line, Series 800, of ball bearing trolleys for overhead conveyors. Dimensions, application data and description of commonly used attachments are given.
- 30 OVERSHOT LOADERS Central Chico
 Steel Products Co., Austin Div., has announced
 a six-page catalog describing and illustrating
 Models 2-C, 4-C, 6-C, 7-C and 8-C Austin overabot loaders. Specifications, principal disses-cions, detailed view of loader, photographs of hydraulic system components and a chematic piping diagram, and available attachments are
- PACKAGE STEAM GENERATORS—Cy-clotherm Division National-United States Radi-stor Corp. has released a 12-page booklet on package citeam generators, giving a compliction of articles which appeared in its house organ, "Cyclotherm fisies Steam." Included are instal-in/an details, once histories, and complets oper-ating records on two bollers.
- ngineering Co. has published Bulletin 3255, scribing the 32 Series pan type conveyors. lotographs, drawings and drive data charts a given, and available replaceable liners are ted. 32

- PACEAGING CARLOADING Sigmode Steel Strapping Co. has released a 44-page booklet estitled "Packaging and Carloading Guide." It shows how to apply strapping to containers, brace open top end closed freight carloads, and barriende car decreways to protect packaged and bulk products. The firm's line of hand and power strapping tools and machines, strapping, seals and accommends are also illustrated. 33
- PNEUMATIC CONTROL—U. S. Electrical Motors Inc. has propared an elght-page besidet, entitled "Automation Through Varitrei Centrei," describing and illustrating the Varitrei Cautroi with U. S. Varidrivo motors. Multi-color creas-sections and disphasous views are included, and a dimensional chematic drawing points out the "power" and "signal" system. Typical automatic control applications are shown, and schematic drawings explain the process with each application. 34
- PORTABLE COMPRESSOR—Ingersoil-Rand Co. has brought out Form 2302, an eight-page filer describing the 3R-36 c.f.m. saif-contained Spot-Air portable compressor, and the tools it operates. On-the-job illustrations are
- POWER UNIT—International Harvester Co. has published an eight-page bookiet describ-ing the International U-282 carbureted power unit, which runs on either gasoline or natural gas. Specifications and performance charts are included, as well as a description of available
- PROTECTIVE HELMETS—Mine fiefety Appliance Co. has brought out Bulletin 0600-3, describing Skullgard protective helmets. Descrip-tions of all models of MSA Skullgards and their applications are included, and a pictorial essay traces each step in the molding of the helmets.
- RADIOACTIVE MINERALS-The Stat 38 RADIOACTIVE MINERALS—The State of Oregos, Department of Geology and Mineral Industries has published a paper, No. 18, entitled "Radioactive Minerals the Prospector Should Kaesew." Prospector techniques and description of radiation detection instruments are included, as wall as an outline of Public Law 565 which amends the mining laws to allow multiple use of the surface of mining class to allow multiple use of the surface of mining class.

- SCRAPER-CRANE—Sausemen Dron., Inc., has announced Field Report No. 228, which describes how to extend crane reach, and also how to double capacity with a Cruscest arraper. A layout drawing illustrates the method. On-the-job photographs are also given.
- SHEAVES—Allis-Chalmers Measufacturing Co. has issued Bullatin 20B6082C, describing rattionary and motion control "Vari-Pitch" sheaves for speed varietions up to 76 percent by means of pitch dismester adjustment, capacities 1 to 600 kp. Included are a table of size, general dimensions of sheaves and a table of general dimensions of "Paradine" ball bearing motion branes for ions with the absence. otor bases, for use with the observed.
- SIGHT AND EYE SAFETY-Silicons Paper Co. of America, Inc., has insued a 14-page bookist entitled "Only One Pair to a Custom-er," describing the eye, how it works, how it can be injured through misuse, and recovery steps. Magic Lens tissue is also described.
- SOIL-CEMENT STABILIZATION-Puttle bone Wood Manufacturing Co. has issued a 36-page brochure ontitled, "The ABC's of Soli-Cement Stabilisation," describing and illustrat-ing how the soli-cement process is being used in construction. Reference charts outline tabular data on proper usage under varying conditions.
- STEAM HOSE-The B. F. Goodrich Co. Industrial Products Div., has bessed a data sheet describing its line of "Burstproof" steam hose. Included are illustrations and specifications for "Superheat" steam hose, wrapped steam hose and steam ironing hose.
- STEEL STRAPPING-Gerrard Steel Strappling Division, United States Stud Corp., has brought out a brochure illustrating and giving schulcal data on its line of heavy duty flot steel strapping equipment and accessory frams. Typical application photographs are also in-cluded.
- TORQUE CONVERTER-TYPE DRIVE-Hyster Co. has released Form 1130, describing and illustrating the "Hystamatic Drive" for YC-40 and UC-30 lift trucks. Operational data, specifications, and a mechanical description of the lift trucks are gives.
- TRACTOR-AIR COMPRESSOR-Wasting-TRACTOMAIR COMPRESSOR—Westing-house Air Brake Co., Le Rei Div., has brought out Bulletin T 3, entitled "Around the Clock, Around the Werld," describing the 125 Tract-air, a tractor-air compressor unit. Specifications, typical applications, a list of attachments and tools, and design features are given.
- VERTICAL MOTOR—General Electric Co. has announced a multi-colored bulletin, No. GEA-6280, describing and illustrating the Tri-Clad, vertical motor ranging from 7½ to 500 kp. Included are cross-sectional views of the motor, installation and maintenance data. 47
- VIBRATING CONVEYOR.—Gifferd-Wood Co. has issued a four-page bulletin illustrating and describing the Oucliveyor vibrating conveyor. Included are operational features, photographs of the unit and its component parts, and three line drawings. Advantages and a list of products handled by the conveyor are also listed.
- WASHING PLANT—Pioneer Engineering Works, Inc., has released Bulletin 648, describing the features, construction and operation of the king-size Pioneer 405-W acrubbing, washing and slaing plant. A cutaway drawing, specifications, and line drawings are included.
- 50 WET DUST COLLECTOR Pengborn Corp. has announced Bulletin 919, describing the type "CW-1" centrifugal wet dust collector. Included are photographs, line drawings and tables giving data on the counter-current, wet cellecter of tower construction.

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Chemistry of Cement

(Continued from page 152)

land cement clinker, is to break up the silicate structure (by its expansive action in hydrating) into fragments of silica of colloid size or less. These silica particles are then hydrated and form the silica gel, which is the starting point in the formation of the hydrated calcium silicates. If some of this lime [now Ca(OH)₂] is adsorbed the amount so adsorbed will depend on the surface area of the gel, which accounts for the various proportions of CaO to SiO₂ found in the hydrated gels. Dr. Bogue states that

2CaO•SiO₃+xH₈O can be obtained only from the hydration of C₂S, not from lime water and silica solutions. He says also that hydrated C₂S contains one more molecule of water than is produced when C₂S is hydrated. To us that would mean that the gel formed in hydrated C₂S is more distended and hence has more surface area to adsorb lime than does the gel formed in the hydration of C₂S. The ultimate product in a saturated limewater solution in both cases appears to be 3CaO•2SiO₃+xH₂O.

Alkali-Aggregate Reaction

The paper by Powers and Steinour may not at first seem to have any relation to the fundamental chemistry of cement hydration or reaction. From much that has been published the general impression seems to be that alkali in any amount is detrimental to cement. Although our authors do not say so, it would appear to us that under the right conditions as described by them even more alkali than is contained in high alkali cements would be advantageous. If the cementing action of portland cement is due to chains or fibers of calcium silicate, cross-connected, and the calcium silicate is composed primarily of silica gel with adsorbed lime, it seems obvious that plenty of silica gel is highly desirable, since this is the reactive form of silica, and the only form that can form the required bonds. The nearer the gel approaches a monocalcium silicate the better the bond.

The paper is prefaced with an elementary explanation of the chemistry of silica, based on a discussion by Dr. P. C. Carman, published in 1940. The authors are to be commended for their clear and simple exposition of the subject. The same data and theories are now available in several recent textbooks on colloid and silicate chemistry. The authors explain the reaction of sodium hydroxide (NaOH) on an hydrated silica particle, or a silicic acid ion, as

-Si-OH+Na+=-Si-O-Na++HaO,

or in explanation of the solution of silica:

> -Si-O-Si+2NaOH==Si-O-Na+, Na+O-Si-H.O.

That formula is rather hard to visualize, but since the Na ion is too large to enter the silica structure between an Si-O-Si bond, the actual breaking of that bond is accomplished by an H ion, which is extremely small and can go any where. Two Si ions cannot be bonded together by an OH ion because this carries but one negative charge, so it can be bonded to only one Si. The freed Na ion can then be bonded to the Si-O on the surface of the silica particle. The Na ions are therefore on the surfaces of the silica particles. They can penetrate the particle only as fast as the H ions penetrate and disperse the silica particles.

The Powers and Steinour paper is a long one with quotations from many published data, and with sound reasoning to justify their conclusions, which are:

"1. Published experimental data on specimens containing reactive aggregate show that the cement can contain some alkali without developing expansion from the alkali-aggregate reaction. The safe amount of alkali depends on the amount of reactive mineral and the size of the reactive particles.

"2. A hypothesis concerning reactions with opal has developed on the basis of the following known facts. Alkali hydroxide can attack opal, forming alkali silicate. Hydration of portland cement saturates the liquid phase with calcium hydroxide. This calcium hydroxide can react with alkali silicate to precipitate lime-alkalisilica complexes. The composition of the complex is dependent on the alkali concentration in solution.

"3. The hypothesis may be stated as follows: (a) The initial reaction produces a thin layer of lime-alkalisilica complex (a non-swelling gel) that separates the unreacted silica from the lime and alkali in the concrete surrounding the particle. The layer of gel contains adsorbed lime and adsorbed alkali that are available to the unreacted silica. (b) The relative amounts of adsorbed lime and adsorbed alkali in the reactive layer of opal are controlled by the alkali content of the solution external to the layer. (c) Adsorbed lime and adsorbed alkali diffuse through the layer to react with the silica. If the ratio of adsorbed lime to adsorbed alkali in the outer part of the layer is kept high enough, lime is delivered to the reaction site fast enough to produce a non-swelling gel. This means that the alkali concentration external to the layer must not be too high at any stage

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of the reaction. (d) If the ratio of adsorbed lime to adsorbed alkali in the outer part of the layer is not high enough, lime cannot reach the reaction site fast enough. Thus an alkalisilica complex, or gel, is produced which can imbibe water and swell, causing expansion of concrete. (e) When a reaction is proceeding safely, forming lime-alkali-silica complex, the reaction of the lime releases some of the alkali that reacted initially. The "regenerated" portion of the alkali is free to continue the attack on the silica. The indications are that under many conditions the safe reaction can continue until all the reactive silica has been converted to a lime-alkalisilica complex. (f) For a safe reaction to proceed, a part of the silica (probably about half) must diffuse out of the particle and react with lime and alkali outside the particle.

"4. Existing data are not ideal for checking the hypothesis, but they give a degree of confirmation. The data are interpreted by means of Kalouseck's data on the distribution of alkali between the solid and liquid phase and the corresponding ratio of adsorbed lime to adsorbed alkali at equilibrium in the presence of excess lime. Such interpretation of data of Woolf and Davis and Vivian leads to these results: (a) For cements containing up to about 0.6 percent alkali oxide the alkali concentration appears to be low enough for safe initial reaction. For safe conditions to continue, the amount of reactive silica must either be negligible or more than a certain minimum determined both by the amount of alkali and the fineness [or reactivity] of the silica. (b) With high-alkali cements, the initial conditions promote unsafe reaction with reactive silica. Rapid reversal to safe conditions is necessary and will occur if the reactive silica presents sufficient surface area. However, if the silica particles are relatively uniform and not extremely fine, the required ratio of reactive silica to alkali oxide is much higher than for low-alkali cement. (c) The effectiveness of a good pozzolanic addition, in preventing expansion, is due to the large area of reactive surface that the pozzolan provides. Thus the high-alkali concentration produced by highalkali cement is reduced sufficiently to permit safe reaction before the larger reactive silica particles have undergone more than shallow, surface reaction. Presumably, the lime reaction can then overtake the alkali reaction.

"5. Cements with less than 0.6 percent alkali are usually safe in the mortar bar test, and in concretes containing reactive silica, apparently because the amount and fineness of the reac-

(Continued on page 172)

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tive silica usually meet the requirements mentioned in 4(a).

"6. Field surveys analyzed statistically might not reveal existing cases of expansion due to alkali-aggregate reaction, if the reactive mineral is coarse and low-alkali cements are involved.

"7. A safe reaction might be converted to an unsafe one if the specimen is dried and resaturated before the reaction is complete."

The authors are to be congratulated on a well-reasoned and clearly explained theory, which appears to reconcile the long established data on the subject, much of which are conflicting. The same kind of painstaking analysis and logical treatment may go far eventually to explain some of the other inconsistencies and mysteries of concrete deterioration about which much conflicting data exist in the literature.

Some Comments

One thing that impresses us about this paper is the important role of reactive silica. It is required to neutralize the excess of alkali as well as has been generally assumed, the excess of lime. We must remember that the aggregate is only the secondary source of reactive silica. The primary source is the cement gel itself. If it is true that plenty of reactive silica as aggregate, or pozzolanic admixture, with the available alkali, produces and pushes a non-expanding gel into the capillaries and pores of the mortar and concrete, thus actually improving it, maybe there should be both more silica and more alkali in cement. For an alkali solution is far more effective in creating a reactive silica than is lime, and this must be true in the hydration of portland cement.

That is only a sample of the kind of thinking or speculation this paper and the other provoke. We shall probably bring the subject up again. One of the chief values in both papers is that they do stimulate fresh thought and new approaches to some old and very puzzling problems in connection with the durability of concrete. Geology has established that in the silicate rocks precipitates or mineral crystals containing both sodium or potassium and lime are more durable as the proportion of alkali increases compared to that of lime. Such silicates (the plagioclases) are very common while exclusively calcium silicates are so rare as to be geological curiosities.

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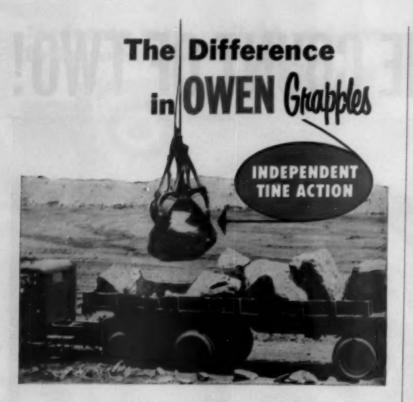
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Modern Vertical Cement Kiln

(Continued from page 130)

The cement plant has a particular significance for a great country like Australia. Long and expensive communications must inevitably slow down modern building activity, particularly in country areas and where attempts are being made to settle new industries, unless cement can be produced locally. If development in rural areas depends on large cement plants situated near the cities, then building costs would be unduly burdened by very heavy freight charges. On the other hand, these areas provide only a comparatively small market which would not justify the large capital expenditure involved in a conventional type cement plant, nor could the large output be disposed of locally. The need therefore is for a plant which is economical to establish and whose output can be sold locally on a profitable hasis.

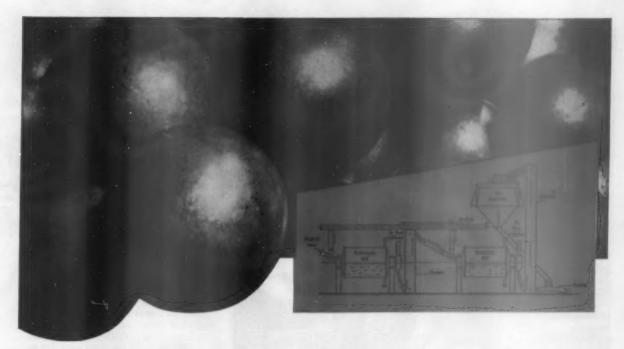
On the question of establishment costs, the present cost of building a conventional type cement plant in Australia is well over 20 pounds (approximately \$44.60 U. S. currency) per ton of annual cement producing capacity, compared with approximately 7 pounds (\$15.60) per ton for a modern vertical kiln. In the conventional wet process plant, the rotary kiln installation alone, involving firing, feeding, cooling and building, may cost nearly one-quarter million pounds (\$557,-500), and this is one of the reasons why such kilns can hardly become economical for small production capacities.

A small cement plant can only be built by incorporating a less expensive kiln; however, this kiln must be up-todate to produce high quality cement in full conformity with standard specification requirements.

However, the problems involved in developing rural areas with small cement plants are not simple. The manufacture of cement consists of a chain of operations, involving raw material preparation, burning, grinding, etc. which fit into each other like links of a chain. If one link breaks, production stops. Therefore, all manufacturing units in a cement plant must be of the highest quality, irrespective of whether the plant is large or small.

The operational safety of the plant must be assured with adequate spare parts which must necessarily burden production costs to a higher extent in the case of the large cement plant. Besides, normal administration duties of handling various returns, taxation matters, compliance with various regulations etc., etc. are in principle the same for the small plant as for the

(Continued on page 176)



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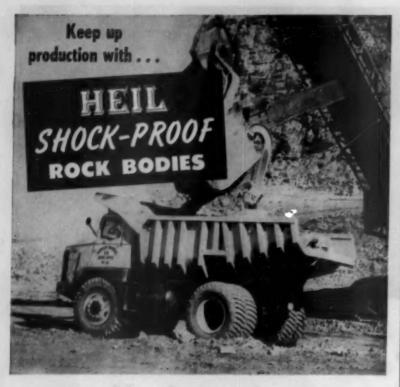
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Modern Vertical Cement Kiln

(Continued from page 174)

large plant; therefore, it is a formidable task to make the operation of a small cement plant as economical as a large one.

The plant in Traralgon was designed and erected under the supervision of the author; and a holding company, Gippsland Industries Ltd., was formed for the promotion of small cement plants in the Southern Hemisphere. Wholly owned subsidiary companies operate the plants, and Dr. Gottlieb is managing director of all the companies; manager of the Traralgon plant is R. J. Seddon; chief engineer, Dr. A. E. Beitlich; plant engineer, R. Schmierer.

Man-Hour Cost Comparison

Concerning the man hours of labor in a modern vertical kiln cement plant, nine men are required per shift, but due to special moisture problems in connection with the raw materials. causing the need for extra men due to material clogging in hoppers etc., the number of men in the plant is higher in comparison to other plants with lower moisture content in the raw materials. The raw mill which dries and grinds in one operation up to a maximum moisture content of 15 percent in the raw materials, needs one man per shift. However, if the moisture content is occasionally higher, an extra dryer with a separate attendant is required. The furnace heating the raw mill has a separate furnaceman; however, the fuel feed to this furnace could be mechanized and the necessity for continuous attendance eliminated. Material handling and proportioning does not require more men than in a rotary kiln plant, and the same applies to the kiln, for which one person is required for each shift. If a comparison is made between a 40,000 tons per year vertical kiln plant to a 150,000 tons per year rotary kiln plant, then of course the rotary kiln plant will require less labor due to the kiln having larger capacity and only one man per shift. Clinker crushing, cement grinding and packing are principally the same in both types of plants, although the vertical kiln clinker leaving the kiln is colder than clinker discharged by a rotary kiln cooler. Mairtenance costs in a modern vertical kiln plant are possibly lower than in a rotary kiln plant due to the lower costs of the spares involved. Kiln relining costs, of course, are much less than the re-lining of a rotary kiln hot zone, but this has not been necessary because this vertical kiln has the same lining as it had 11/2 years ago when operations started,

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By finish grinding a carefully selected crown radius on roller ends, Rollway relieves high stress areas, insures uniform distribution of load over the entire length of the roller. Rollers can take heavier loads without excessive end-fatigue, and are less subject to the effect of slight misalignment or deflection.

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● MORRIS TYPE R SLURRY PUMP at the left is on continuous 24-hr. duty delivering 1000 GPM of a 170° lime slurry at 100′ head. Fifty-HP motor operates at 1180 RPM. Intermittent-duty pump at right delivers 200 GPM at 50′ head with 7½-HP motor turning at 880 RPM.

n slurry-handling operations, "long-term service" is a meaningless claim unless the pump will work day-in and day-out with a minimum of maintenance time, trouble and expense

Morris Type R Slurry Pumps—with an established reputation for longer life—also incorporate in their design exclusive features which result in easier installation . . . fewer interruptions to service...less overhaul...fewer replacements.

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The gland is under suction pressure only. This reduces leakage and dilution . . . keeps harsh abrasives out of the stuffing box . . . practically eliminates packing troubles.

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© Froe Service. Marris Engineers will be glad to recommend the pump best suited to your needs for size, capacity, etc. Send necessary data today . . . include request for Bulletin 181.

MORRIS MACHINE WORKS

Baldwinsville, N. Y. Sales Offices in Principal Cities



N.A.L.I. Meeting

(Continued from page 160)

the following week. Therefore, producers desiring to attend both conventions may do so. The additional attraction of the machinery show should not only boost N.A.L.I.'s attendance toward 400 or more but should be of considerable interest to the manufacturers. The Board agreed to have committee meetings, including the Executive Committee Meeting and the Board Meeting on February 13 and 14, the first day of the convention program to begin on February 15. February 16 will be an open day when all members can go to the machinery show at the Colesium and February 17 will be the final convention day with the annual banquet on Friday evening. The Board also approved the site of St. Louis for the 1956 mid-year board

The Membership Committee reported on the status of N.A.L.I. membership and on the results of membership drives. Present N.A.L.I. membership is 404 producers of agricultural limestone. In the first five months of 1955, 49 new members were gained.

New Sales Promotion Ideas

The Promotion and Education Committee considered new and approved ways of promoting aglime sales. The committee approved a new circular telling the liming story relative to crops grown in the South. Already this year N.A.L.I. has published a circular entitled. "Have You Seen Emil Disease?," an idea developed by Dr. Samuel Aldrich, Extension Agronomist at Cornell University which presents a new method of getting the aglime story across to the farmer. A promotion committee report showed that sales of circulars promoting aglime were greater in the first six months of this year than in the entire year of 1954 which shows new efforts being put forth by producers to stimulate sales of their product.

The Legislative Committee reported on activities in connection with the passage of the appropriation of the 1955 and 1956 Agricultural Conservation Programs and on the repeal of the Holland Amendment which restricted the use of limestone in many areas.

The Committee on Percentage Depletion reported on N.A.L.I.'s efforts to amend the tax code to permit fiscal year companies to take 15 percent of their gross income on agricultural limestone sales as of January 1, 1954. As the law reads now, fiscal year companies can take 15 percent beginning only with the month in which their fiscal year started after January 1, 1954.

Hardfacing

For Manual Application

	FACING RO	~ 100 1 HEAF	Copplication.		
		D CONDITION	FOR THIS EQUIPME		CAT
d	VICTORTUBE	Severa abrasio	Scerifier teeth, dredge of blades, posthole augers field tools, ditcher teeth	utter , oil	1 Ac
	"SPECIAL"	Abrasion, severe impact	Tools, direner feeth		AC-DC
1	VICTOR TUNGSMOOTH	Thin cutting edges	Coal cutters, brick augers, mill knives, screw convey farm tools	pug ors,	Acet AC-DC
1	VICTORITE	Earth abrasion or sliding friction	Plawshares, cultivators, 3 mill guides, coment chu shaft bearings, rolling a guides	teel tes,	Acety AC-DC El
-	TUBE VICTORITE	Abrasion, impact	Plow points and form teels		Acety
	VICTORITE 1	Corresion, heat, abrasion	Saw feeth, carbon scrape	rs,	AC-DC El
,	VICTORITE 6	Red heat, impact, corrosion and abrasion	Blanking, forming and trir	No.	AC-DC Ele
-	ICTORITE 12	Heat, abrasion, impact	Saw blade income	1.0	Acety.
C	ARBON ARC	High abrasion, thin deposit	critical applications Plowshares, lister shares, sweeps	A	C-DC Elec
_	CTORALLOY	Abrasion, severe impact	Tractor rollers, dredge pump impellers, bucket lips and teeth, rock crushers, steel mill wobblers, roll crushers	1	Acety. Acety. DC Elec.
-	CTORALLOY #1	High abrasion, medium impact	Bucket lips, reck crushers, Muller tires, gyratories	-	l colu
A		Angular shock, extreme impact, build-up	Clutch parts, goars, crusher	AC-I	C Eloc.
VIC	TORALLOY	Heavy impact, moderate abrasion	Tractor rollers and	1 0	nly
'C"	TORALLOY	High abrasion, moderate shock and impact	shovel peds, plates, idlers, etc. Tracter grousers, pressure rolls, crusher segments, relicusher teeth	AC-DC	Elec.

Also VICTOR Bulk Metals, VICTORITE Plow Point Bers, and VICTOR Super-Titan Blasting Hozzles

For automatic application

THIS TYPE	FOR THESE CONDITIONS	ON THIS KIND OF EQUIPMENT
VA #1	Abrasion, medium impact	Crusher rolls, crushers, gyratery crushers
VA #2	Abrasion, impact, Multi-pass application	Steel mill applications
VA #3	Abrasion, light impact	Mill guides, crushers, dredge bushings
VA #4	Multiple layer build-up	Tractor rails, crane wheels, general build-u
VA #5	Heavy impact, obrasion	Tractor rollers, idlors, mine car wheels,
VA #6	Medium abrasion, high impact	Crane wheels, drums, roll necks
VA #7	Abrasian, high impact	Build-up for hardfacing
VA #8	Abrasion, medium impact	Dozer bits, roll crushers, scraper blades
VT #60	Extreme obresion	Tool joints, grader blades, scraper blades, augers

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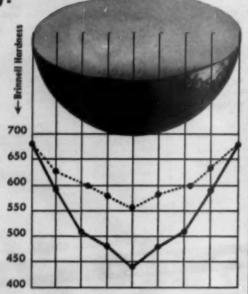
H-17



Forged from AFCO's new improved carbon steel, AFCO "IC" deep hardened grinding balls offer deep, penetrating hardness comparable to many types of costly alloy balls—yet they are priced competitively with media forged from ordinary carbon steel.

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PRODUCTS

Selecting Cement Raw Materials

(Continued from page 132)

still be considerably larger in size than the particle of lime.

Since grinding is commonly controlled at approximately 90 percent 200 mesh, there may be differentials between the substances of different hardness at this point. Study of the kiln feed is very important. Lack of homogeneity of the finished product and excessive amount of free lime may be traced to this cause. The kiln feed may be of proper chemical composition and still produce a hard burning mix which is difficult to control. Thus, chert increases production costs throughout the process and is likely to produce an inferior finished product if present in appreciable quantities.

Silica sand may be present in limestone, and if the particles are of significant size, this will have the same

effect as the chert.

Magnesia may be present and erratically distributed throughout limestones. If the magnesia is uniformly distributed, it is possible to tolerate up to 5 percent magnesium carbonate in the rock. If it is erratically distributed, additional mixing is necessary, and there is a possibility that some of the product will be of inferior quality. Rapid cooling decreases the possibility of periclase crystallizing out of the glass phase, permitting the MgO content to go as high as 5 percent in the clinker without danger.

Iron in the form of pyrite can be tolerated to the point where the SO_a content becomes too high. Sulphur fumes are annoying and may necessitate expensive correcting devices. If it requires disposal of collected dust which could otherwise be recirculated, this can be a very important cost item. Recirculated material sometimes is as high as 25 percent, and almost all of the production costs have been

already applied.

The presence of clay minerals contributes to the required alumina and silica, and in limited quantities is desirable.

Marine shells have been frequently used as a source of calcium-carbonate. The grindability of oyster shells is higher than that of clam shells. The hinge portion of an oyster shell is considerably harder than the lip. The Na₂O content of oyster shells can vary from 0.2 percent to 0.46 percent. If the latter condition prevails, production of a cement with low soda content may be quite difficult.

Argillaceous Component

The argillaceous component of portland cement can be supplied in numerous forms. This component supBAY CITY

3/4-YARD SHOVEL
handling 800-1000 tons
blasted rock per day
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CATSKILL MOUNTAIN
STONE
CORPORATION

"Our BAY CITY Model 45 shovel with 34-yard rock type dipper not only averages 800 to 1000 tons of blasted rock per 10-hour day in feeding the crusher, but it also sorts out stones weighing up to 6 tons for secondary blasting," says Mr. W. H. Peckham, President of Catskill Mountain Stone Corporation. BAY CITY doubled the daily production over a former light duty 34-yard shovel, proving once again that for heavy duty work there's nothing like the tough, powerful BAY CITY. It has double dipper sticks, 3-part line, a 6-foot rotating path, helical cut gears, separate shafts and bearings for each hoist drum, and it is powered by a big 517 cubic inch Waukesha engine. These specifications compare favorably with many 1-yard shovels. Get complete information on the BAY CITY 45 from your BAY CITY dealer.



Write for these catalogs describing Bay CITY Crawlers of ½ yards and up, Bay CITY Crane Mobiles and CraneWagons in sapacities to 25 tons.



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SHOVELS . CRANES . HOES . DRAGLINES . CLAMSHELLS

ROCK PRODUCTS, August, 1955

Are your bags salesmen ?

A prominent Mid-western company in the rock products field recently instructed its salesmen:

"Exploit the fact that we use Bemis Multiwall Bags 100% and capitalize on the established excellent reputation of the Bemis Bro. Bag Company for quality workmanship and materials."

We are naturally pleased by this testimonial to the quality which we constantly work to put into your bags.

Even more, we are glad to have such confirmation of a point we have often stressed:

Good, well printed bags are a real sales help!



plies the silica to react with the lime to form cementitious compounds. The alumina present provides flux for the reaction. There is ordinarily an appreciable portion of free silica in the size ranges from clay particles (minus two micron) to fine sand. Following are some of the types of deposits which have been utilized for cement manufacture:

Residual clays from the decomposi-

sition of older rocks

Alluvial clays Bedded marine clays

Shales

Slates Phyllites

Phyllite Schists

Each of these types of deposits has rather distinctive chemical and physical properties.

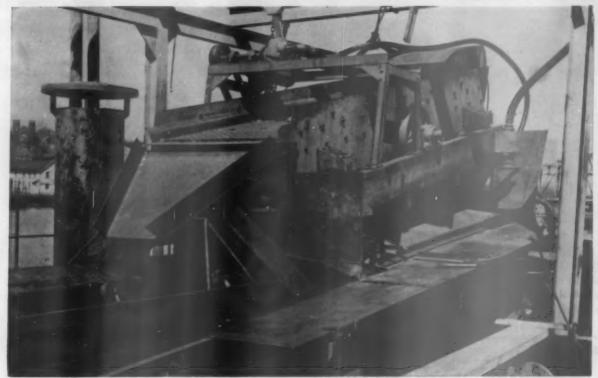
The residual clays from the decomposition of igneous rocks may have compositions varying from the extremes of laterization to slightly decomposed rock with the original crystal structure intact. Both extremes are quite unsatisfactory. Bauxite contains far too much alumina and insufficient silica, requiring additional components. Kaolin is quite refractory and is deficient in silica. In intermediate stages of decomposition this type of material may contain enough of the flux material such as iron and enough free silica to make up for the deficiencies of the kaolin. The deposit is not likely to be homogenous. If the rock is only slightly decomposed, it will probably contain relatively large fragments of material which are difficult to grind. In addition, alkaline oxides may remain in the feldspars. In general, rocks of this type are rather unsatisfactory but may provide an adequate source of raw material if other sources are too expensive.

In alluvial deposits it is rather easy to find an argillaceous material suitable for use with limestone. Corresponding to the size gradation from a natural levee into the back-swamp deposits there is a gradual decrease in free silica content. If a meandering stream has been fixed long enough for deposits of sufficient size to form, it is possible to select the section with optimum ratio of silicate to alumina. Deposits of this kind may have a natural water content of 30 percent to 50 percent, requiring the transportation of appreciable tonnages of water. Since they are very finely divided, grinding is unnecessary and the argillaceous materials may be mixed with the ground limestone. To use a material of this type in a dry process plant would require drying of the clay. The alkali content of this material may be rather high, but it can be utilized in

(Continued on page 184)

Keeping OYSTERS HEALTH the job of this SECO SCREEN





Photograph Courtesy of Atlantic Fisherman Magazine

Separates Sand and Drills from Oysters on Deck of Dredge

Oysters are a far cry from aggregates . . . but this on-thejob report from F. Mansfield & Sons, New Haven, Conn., is another interesting example of SECO screenability on all types of difficult screening assignments.

This 4x12 double deck SECO is mounted on the deck of the suction oyster dredge, "Quinnipiac", which operates out of New Haven, Conn.

Here is a new and highly efficient method of ridding the oysters of drills (snails) which cling to and destroy the oysters unless removed. In this operation, the oysters are dewatered and cleaned as they pass over the top deck onto a rubber conveyor. The drills are shaken loose and drop through to the lower deck from which they are discharged and destroyed.

One of the factors that make this installation of such interest to anyone with a screening problem is the fact that this SECO screen does its job at sea, performing smoothly in spite of the pitching and rolling of the dredge caused by the sea.

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Only SECO has fully-controlled true circular action for smooth, accurate acreening results. Over 350 models in single, double, triple and 3½ decks.

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BUFFALO 25, N.Y.

AKINS Classifiers washing oyster shell for cement



TYPICAL OF SPECIAL APPLICATIONS WHERE AKINS EXCELS IN MEETING EXACTING REQUIREMENTS AT LOW COST.

Clean, high grade deposits of oyster shell are badly depleted and shell producers require washing equipment for processing low grade shell which is contaminated with mud and slime. Akins Classifiers have been their choice because they produce a cleaner product, handle large tonnage at low cost.

Akins Classifiers designed for oyster shell washing may be equipped with special scrubbing devices if additional washing action is required. The Akins Spray Water Box also may be added for difficult washing problems.

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Selecting Raw Materials

(Continued from page 182)

conjunction with a low alkali source of calcium-carbonate.

Marine clays tend to be of an illitic nature. The proportion of free silica can vary greatly as can other residual minerals such as mica. Calcium-carbonate may be precipitated at the time of deposition of the clay. If the amount of calcium-carbonate is relatively high, the ratio of silica to alumina is likely to be low, as less free silica is deposited. in a sea from which calcium-carbonate and clay are depositing (chert excepted). The illite molecules react at a lower temperature than kaolinite or montmorillonite. However, among the fluxing agents there is likely to be an appreciable percentage of K₂O and Na₂O, and selection of a marine clay low in these compounds may be rather difficult. Marine clays readily slake to a mud, making quarrying difficult at times. They contain a rather high proportion of water, both surface moisture and water of crystallization. They require little grinding, but drying may be necessary for a dry process plant. If the clay should contain an appreciable percentage of montmorillonite, the water requirement may be considerably increased in a wet process plant. It could increase the moisture content necessary to produce a pumpable slurry by 10 percent, increasing cost of fuel.

Shales, slates, phyllites, and schists represent successive degrees of metamorphism of the argillaceous sediments. The grindability decreases with increasing metamorphism. Water of crystallization also decreases as the clay molecules are altered. This decreases the water requirement to produce a pumpable slurry, but other properties even further decrease the water content. Utilizing a schistose argillaceous component has lowered the moisture necessary to produce a pumpable slurry to 30 percent. Some alluvial clays are not even muddy at this point. There is a tendency for metasomatic addition of alkali with metamorphism.

The subject of alkali content has been mentioned several times. The effect in burning has been discussed. It may be appropriate to digress on this subject a little and illustrate the importance of this problem.

Even with a source of calcium-carbonate as pure as oyster shell, there is from 0.2 percent to 0.46 percent Na₀O present. On an ignited basis, this increases to 0.35 percent and 0.58 percent Na₀O.

Average analyses of various argillaceous materials have been taken from "Data of Geochemistry" and the

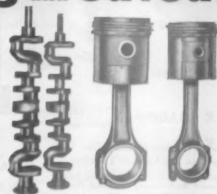


These Crushing Plants **Went Shopping** and Saved!

An MM 425-6A LP gas power unit best filled the requirements of this Illinois sand and gravel producer when he went looking for a heavy-duty engine to power roll and jaw crushers. His objective was to get

- a factory equipped engine for lowest cost fuel
 low fuel consumption at maxim power and load
- minimum down time and maintenance convenience of installation and operation.

The 425-6A more than filled the bill because MM engines are fully and separately designed for gasoline, LP gas, natural gas, diesel, or distillate-MM high turbulence combustion and ample displacement result in high torque at low rpm-long-run features like MM vacuum crankcase ventilation and improved oil filtering require less service—available equipment includes selection of power take-off drives, couplings, rotation and speeds-partial or full enclosures-radiator or cooling coil-choice of location for controls and instruments-electric starter and generator-watercooled manifolds and heat exchanger jacketed base pan.



Here is how MM part size goes up as displacement and hp go up to supply heavier construction necessary for continuous heavy load operation. Crankshaft, connecting rod, and piston of AMA's 108 hp 605-6A ongine are shown side by side with those of the next larger AMA engine, the 148 hp 800-6A. Size and weight where it



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THE W. W.



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STREET.....STATE......STATE.....

alkali content of the material calcuated on a moisture-free basis. These are shown in the following table:

Alkali Content of Argillaceous Materials*

NasO KsO Total Weight Percent	12 Clays 1.38 2.32 3.64	78 Shales 1.38 3.42 4.80
NacO KcO Total Weight Percent	22 Slates 2.48 3.28 5.96	5 Schists 1.82 3.35 5.17

From Data of Geochemistry, F. W. Clark, U. S. Goological Survey.

Any of these materials would come close to supplying the alumina and silica to go with shell at a ratio of about one part clay to four parts shell. It is obvious that it will be difficult to prepare a mixture in which the soda alone will not be nearly 1 percent on the ignited basis. There are two possible answers to this problem. First is to search until a material is found which will be low enough in alkali that no trouble will be encountered. Since the figures given are averages, the possibility of doing this is likely to be remote. Second, certain proportions of soda and potash are burned off in normal kiln operations. The amount volatilized is dependent upon the physical plant, the method of operation, the relative ease of volatilization from the mineralogical constituents. and addition of fuming aids such as CaCl_a.

If alkaline chlorides are present, they are quite easily volatilized. Alkalies present in minerals of igneous origin appear to be most refractory (micas and feldspars). Alkalies in the clay and hydromica lattice are intermediate between these two. This is a field which will receive a great deal of investigation in the future.

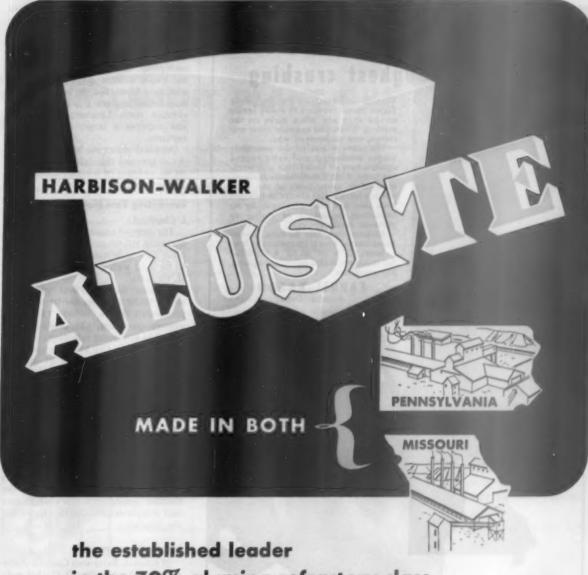
In plant practice from none to 60 percent (average, 33.3 percent) of the soda and from 30 percent to 92 percent (average 66.7 percent) of the potash are volatilized.

Minor Components

Many times it is impossible to prepare a suitable chemical "mix" from two constituents alone. A third and even a fourth component must be added. This means additional component storage, proportioning equipment, and mixing equipment to obtain homogeneity. Labor costs, of course, are also increased. Among the most common additives is silica. The ratio of silica to alumina is frequently too low in calcareous deposits. This may be added as sandstone, sand. or any other form, but it is desirable to have a material that is easily pulverized. If a source of diatomaceous earth or tripoli is readily available, it is admirably suited to this purpose.

Frequently iron ore or a material high

(Continued on page 188)



in the 70% alumina refractory class

The superior physical properties and chemical composition of ALUSITE long ago established its leadership in the 70% Alumina Refractory Class.

Outstanding service records made by ALUSITE in rotary kilns are attributable to its low porosity, high strength, volume stability and excellent spalling and flux resistance.

Some highly economical applications of

ALUSITE are the following:

- · High temperature zones of cement kilns
- · Transition zones of basic-brick-lined cement, magnesite and dolomite kilns
- Calcining zones of lime, lime-sludge, magnesite and dolomite kilns

Included in Harbison-Walker products are refractories for every rotary kiln plant requirement.



Harbison-Walker Refractories Company

AND SUBSIDIARIES

WORLD'S LARGEST PRODUCER OF REFRACTORIES

General Offices Pittsburgh 22, Pennsylvania

ROCK PRODUCTS, August, 1955





KEEP
ABREAST
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INDUSTRY
TRENDS
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PRODUCTS

in Fe₂O₃ is added. It is desirable to have this in a rather pure form, since silica accompanying iron is difficult to grind, and if alumina is present it counteracts the addition of iron. The alumina multiplied by 1.3, subtracted from the Fe₂O₃ content gives the net iron addition. Magnetite is less desirable than hematite since it is in a partially reduced state. Limonite is hydrated and requires a larger quantity than hematite.

At some plants the alumina content is too low and this deficiency is made up by addition of a high alumina clay or by bauxite.

Evaluating Raw Materials

I. Chemical

The deposit must have the proper chemical constituents with respect to other raw materials which may have to be used with it.

II. Physical

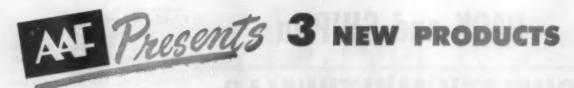
It must have physical properties which make it amenable to low cost processing. These include (1) inexpensive quarrying, (2) easily pulverized, (3) low water retention, (4) low volatile losses, (5) low reaction temperatures, (6) uniformity of quality, and (7) ease of blending.

III. Economic

The deposit must be so located with respect to the market, transportation, and utilities that the cost of the raw material is insignificant to the sale price. Further, the properties of the material must be such that low cost processing is obtained throughout the plant. Compromises must be made in each of these fields to produce the finished cement at a low enough cost that a mass market can be created for the product.

Labor Agreements

NATIONAL SAND AND GRAVEL ASSO-CIATION, Washington, D. C., has published "Standard Clauses for Labor Agreements in the Sand and Gravel and Ready Mixed Concrete Industries" by Vincent P. Ahearn, executive secretary, and Charles A. Horsky, association counsel. This is the third issue of the publication, the first edition having antedated the Taft-Hartley Act and second edition having followed enactment of the Taft-Hartley Act. The new edition gives current information and advice in the light of judicial and administrative developments since the second edition was published. The book is designed not only to assist companies whose employes have voted to be represented by a collective bargaining agent but also to help companies who wish to develop sound employment policies in the absence of the necessity to engage in collective bargaining.



FOR CEMENT PLANT DUST CONTROL

AMERcione Dry Centrifugul Collector designed to handle large exhaust volumes containing dry, granular dust in large concentrations. Strictly a product of AAF research, AMERcione offers many features new to dry centrifugal design that result in these important advantages—

High Collection Efficiency. AMERclone offers collection efficiencies equal to or better than any centrifugal unit available today.

Requires Less Space. The fact that a single AMERcione tube, 4" in diameter, has a cleaning capacity of 333 cfm as compared to a 100 to 150 cfm rating for conventional units makes for important space savings.

Less Subject to Abrasion. Abrasion resistance qualities are greatly increased with the use of thick wall gray iron castings, plus the fact that in AMERclone operation there is no recirculation of dust load to increase abrasive effect.

Mointains Efficiency. Collection efficiency of the AMERcione remains practically constant over a wide range of exhaust volumes with the compensating feature of the secondary air circuit.

For complete AMERclone data, write for AAF Bulletin No. 291.





AMER Jet

2 AMERIOT Fabric Arrester designed to handle extremely fine particles or collect material dry for reclaiming. Like all AAF Dust Control Products, AMERIOT offers these basic features: (1) small space requirements; (2) maintained performance ever a wide range of operating conditions; (3) constant exhaust volume; (4) high collection efficiency.

For complete AMERIOT Arrester designed to handle extremely for several dry for severa

3 Design 4 Type N ROTO-CLONE Hydro-Static Collector—A new version of AAF's famous Hydro-static precipitator which, in addition to the proven high efficiency cleaning action of its inverted S-shape water curtain, now offers—

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- Improved water level control maintains performance under extremes in operating conditions.

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The new construction vasily improves the electric heating circuit, reduces power consumption, eliminates "make and break" electrical connections to the jacket, cimplifies acreen jacket changes and tensioning, assures effective overall vibration for open mechfull capacity acreening. Send for complete data.



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Fine Sand Recovery

(Continued for page 67)

culated to the water scalper if the finished sand pulp is too liquid. Normally 70 percent solids is produced in the lower cone. This fine sand is then pumped by a Galigher, rubber lined (3-in.) pump to the far end of the off-bearing sand belt conveyor and discharges to the sand pile formed there where blending is accomplished. A tractor and dozer can push the sand back for added mixing if desired.

At the Sully-Miller operation, the primary overflow from the cyclones is pumped to waste by a 6-in. Wemco sand pump. The Krebs cyclones are rubber-lined, but the outlet or first cone overflow section has been hard-faced. The cyclones are recovering 97 percent of the plus 275 mesh sand. The feed is very low in solids, judging from its appearance, but the liquid cyclones are recovering a total of 15 to 18 t.p.h. Finished sand from the cyclones can be sent by chute to the toe of the off-bearing belt conveyor, if desired.

Typical screen analyses of the finished sand from the Krebs cyclones are as follows:

Passing	%	%	%
No. 30	100	100	100
40	98	97	96
50	88	90	83
80	60	63	57
100	40	44	38
200	15	18	14

Digging in the pit is done with a 2-cu. yd. Bucyrus-Erie shovel with four Euclid bottom dumpers hauling to the plant.

The Sully-Miller Contracting Co. has offices at the plant. W. S. Clary is superintendent, Earl Anderson is assistant plant superintendent, Tom Taylor is plant foreman, and E. J. Woodward, Jr., is plant and materials engineer.

Report on Lightweight Aggregates

MINES BRANCH, Canadian Department of Mines and Technical Surveys, Ottawa, Canada, has published Memorandum Series No. 128, "Preliminary Report on Coated Lightweight Concrete Aggregate from Canadian Clays and Shales—Part 6—British Columbia." Price: 50é

Marquette Increases Shares

MARQUETTE CEMENT MANUFACTURING Co., Chicago, Ill., has increased the number of authorized common shares from 1,000,000 to 1,200,000. The additional shares, which will be identical with those outstanding, were authorized in order to cover opportunities for expansion which may arise.



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Periite Institute beerd of directors at the annual perlite meeting are (left to right): vice-president, J. C. Kingsbury (F. E. Schundler & Co., Inc.); O. Lewis Staerker (Tennessee Products and Chemical Corp.); Kirk E. Hazleton (Great Lakes Carbon Corp.); Norman Braun (Cleveland Gypsum Co.); president, Lewis Lloyd (Alatex Construction Service); and Frank Schaeffer (Perlite Products Co.). Director T. C. Ward, Jr. (Perlite Manufacturing Co.) is not shown. Mr. Schaeffer was elected a new director and Messrs. Kingsbury, Staerker, and Braun were re-elected directors

Perlite Institute Plans Another Record Year

Members of the Perlite Institute attending the sixth annual meeting in April, heard an encouraging progress report and laid plans for further new research and development work on perlite for use in lightweight plaster and concrete. The meeting was held at the Hotel Shoreham, Washington, D. C., with representatives on hand from 34 perlite plants in 20 states. Several officials from the National Bureau of Standards and the Bureau of Mines also were present. Total registration was 114, making this the Institute's largest meeting.

All previous records for perlite production were also broken in 1954. The tonnage of expanded perlite consumed is estimated to be about 208,000 tons, or nearly 50,000,000 cu. ft., an increase of about 19 percent over 1953. The increase was particularly evident in the plastering industry, where between 35 and 40 percent of all plaster applied in the United States last year used perlite aggregate.

To help promote the continued growth of the perlite market, the Institute approved a new \$18,000-a-year basic research program to be conducted by a qualified university. The research will explore various physical characteristics of perlite with a view to developing new uses and improved techniques for the use of the product in lightweight plaster and insulating concrete. Selection of the university which will conduct the research will

be made shortly. The technical and engineering facilities of the Institute office will also be expanded this year with the employment of an additional engineer.

Action was also taken to permit the formation of a West Coast regional group of perlite producers within the framework of the institute. The na-

tional office of the Institute is now authorized to arrange special meetings for West Coast members to consider their regional problems, and to assist them in their relations with architects and contractors. Members of the regional group would have all of the privileges and responsibilities of other Institute members. One of the major objectives of the Institute in setting up a provision for such a West Coast membership group is to encourage the adoption and observance of uniform perlite specifications from coast to coast.

Statistics released by the Institute indicate increased acceptance and use of the Perlite Institute's certification seal during the past year. Nearly 90 percent of the eligible members now use this trademarked seal on bags to guarantee the quality of plaster aggregate. The seal guarantees that the aggregate conforms to A.S.T.M. specifications, and certifies that it is regularly sampled and tested by Pittsburgh Testing Laboratory.

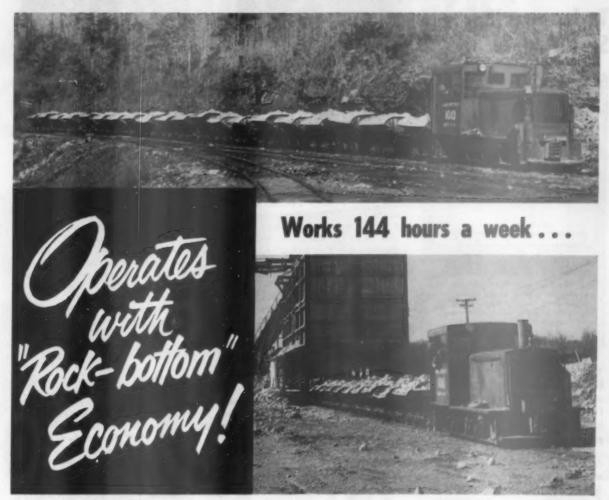
It was pointed out that the A.S.T.M. specification for plaster aggregates had been revised last year, but no changes were made in the section dealing with perlite. Specifications designated as A.S.T.M. C 35-53 T and C35-54 T are therefore identical so far as perlite plaster aggregate is concerned.

Factors affecting the strength and fracture resistance of perlite-gypsum plaster were discussed by Earl Rosa, chairman of the perlite plaster committee. The committee's research showed that satisfactory perlite plaster depends primarily on the on-the-wall strength developed by the plaster.

To obtain the necessary strength, the committee recommended use of perlite aggregate conforming to A. S. T. M.

(Continued on page 196)

Pulls 20 cars loaded with limestone.



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Near Batesville, Arkansas, at the quarry of the Batesville White Lime Company, where the above photos were taken, M. S. Stokes, Treasurer, reports, "Our 20-ton Plymouth operates eighteen 8-hour shifts a week over a 2.7 mile track. Grades go up to 3%, but we pull 20 loaded cars with ease. Operaton is easy and economical; we use only a gallon of fuel an hour!"

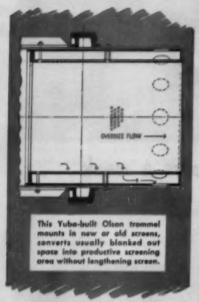
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*Torgametive Drive: Plymouth transmission coupled to a hydraulic Torque-Converter,

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Newly elected officers and board of directors of the Empire State Sand, Gravel and

Empire State Meeting Elects Officers

AT THE FOURTH ANNUAL MEETING of the Empire State Sand, Gravel and Ready Mix Association, held May 17 and 18 at the Hotel Rochester, Rochester, N. Y., Wilbur J. Rogers, Hudson Valley Concrete Corp., Newburgh, was elected president, succeeding William W. Nass. Other officers elected were Edward J. Nunan, Buffalo Slag Co., Buffalo, vice-president; Harold Keahon, Keahon Bros., Inc., Pearl River, secretary; and John Hopkins, Albany Gravel Co., Albany, treasurer. Newly elected directors were J. P. McCullough, Harold A. Putnam, Frank Cooney, Jr., and J. C. McIntosh.

The meeting was preceded on May 16 by a dinner meeting of the board of directors and the annual meeting of the associate members. Melvin E. Rupp, Rupp Equipment Co., was elected chairman of the associate member group for 1955-56.

Forty-five active member firms were represented at the meeting, and attendance at the annual banquet numbered 118. M. W. Ottershagen, deputy administrator, St. Lawrence Seaway Development Corp., was the featured

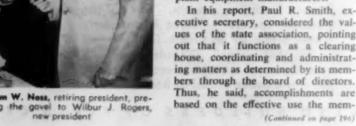
banquet speaker, and several New York legislators were guests.

At the sand and gravel session, George Krom, chairman of the sand and gravel committee, gave a progress report of his committee's work with the state in the matter of specifications. The association recommended that the committee confer with the New York State Department of Public Works regarding sampling the finished product. Leon H. Wendel, Gasport Sand and Gravel Co., Lockport, presented a paper on "Problems of Testing as It Affects the Producer." This was followed by a panel discussion, moderated by Mr. Krom.

Reports were also given on percentage depletion and depreciation by Paul J. Kremer, Buffalo Slag Co.; and on safety by H. H. Kirwin, Eastern Rock Products Inc., Utica.; Paul C. Riefler, Paul C. Reifler Inc., Hamburg; and Alfred B. Hoftiezer, Laverick and Haines, Inc., Buffalo. In his legislative committee report, J. P. McCullough, Central Materials Corp., Canadaigua, discussed the future of the industry in New York State.

The ready mixed concrete session featured the film "Quality Ready Mix Concrete," produced jointly by National Ready Mixed Concrete Association and Portland Cement Association. W. J. McIntosh, P.C.A. district engineer, New York, N. Y., discussed promotion aids for the industry. This was followed by a committee report and panel discussion, moderated by E. J. Nunan. The panel members consisted of producers and truck and plant equipment manufacturers.

In his report, Paul R. Smith, executive secretary, considered the values of the state association, pointing out that it functions as a clearing house, coordinating and administrating matters as determined by its members through the board of directors. Thus, he said, accomplishments are based on the effective use the mem-





William W. Noss, retiring president, presenting the gavel to Wilbur J. Rogers,

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Perlite Institute

(Continued from page 192)

specification C 35-53 T, in combination with fast setting gypsum. In areas where the available gypsum tends to set slowly when used with perlite, it was recommended that contractors be strongly urged to add sufficient accelerator to assure a plaster setting time of three to six hours.

Publication and availability of a new A.S.T.M. specification, C 332-54 T, covering perlite and other very lightweight aggregates for insulating concrete, was announced by S. Foster Bartlett, chairman of the perlite concrete committee. This specification delineates the differences between the 8 lb. per cu. ft. aggregates such as perlite, and the 65 lb. per cu. ft. materials also referred to as lightweight aggregates.

Promote New Type House

Several members expressed an interest in the development and promotion of steel frame houses constructed primarily of perlite plaster and perlite insulating concrete. A number of homes of this type have been successfully erected in various parts of the country. However, it was felt that there was not enough data available to warrant development of a Perlite Institute approved house at this time. The Institute staff was directed to develop further information on the subject.

Principal speaker at the meeting was J. Stanley Young, Chief of the Property Requirements Section, Architectural Standards Division of the Federal Housing Administration. Mr. Young talked on FHA policy and procedures to be followed in obtaining approval for use of materials and construction methods in FHA insured homes.

The date and place of the next Perlite Institute meeting were tentatively set for May 14-18, 1956, in Ponte Verde Beach, Fla.

Empire State Meeting

(Continued from page 194)

bers make of the association. During the meeting, Mr. Smith was authorized to meet in the near future with representatives of allied industries for the purpose of formulation of proposed legislation affecting all those engaged in businesses where excavations are involved.

The association voted to donate \$500 to the New York Good Roads Association for educational purposes. It was announced that the Fall Meeting of the association would be held at the U. S. Hotel Thayer, West Point, October 20 and 21.

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Severest weather conditions have not affected in any way the Slo-Speed motor driving our 250-ft. outdoor inclined belt conveyor which is in constant use up to 14 hours per day, reports Gene Herbst, Vice-President, Central Concrete Co., St. Louis. We attribute this uninterrupted service to rugged construction and Sterling's protected dripproof design.

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that gives you extra speed on the job and to and from jobs that means extra profits to you! Pound for pound, dollar for dollar, the Dempster-Diggster GRD-101 will out-dig and out-load any other available competing machine in tough going! Let us prove that statement! Write for complete information. Manufactured by Dempster Brothers, Inc.

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Shooting Kiln Rings

(Continued from page 81)

let the entire mass come out. Actual instances where 50 shells accomplished this have been observed. The condition of the brick is important, as a fairly new and smooth surface will allow the scale to let go a little easier than a rough surface.

Shooting a "Soft" Ring

In shooting a "soft" ring, the best practice is generally to knock out the back portions of the ring and leave in the front part. The kiln may be shut off from normal operation and the gun placed within a few minutes. Shooting can start right away. Pick out a flat spot on a thin place in the ring and cut a notch. From this notch work either way, shooting as deep in the ring as appears effective. Often it is advantageous to work around the entire ring as quickly as possible to open up weak places where further cracking may occur. This soft scale breaks better while hot, as may easily be confirmed by actual observation in the kiln and of pieces of scale coming out of the kiln in regular shift opera-

Shoot out a fairly smooth opening in the kiln and light up promptly. The

(Continued on page 200)

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Just one man mixes all the concrete needed to keep Dixie Concrete Pipe's equipment humming. An electrically-powered, mixed concrete hopper with remote control places mix in pipe machines. Plant will meet future needs of a pre-cast products casting yard also. Sold by Industrial Tractor and Equipment Company, Nashville.

PANY, Nashville, supplies a large part of the concrete products for the busy Middle Tennessee area. This includes the pipe for Nashville's new sewage disposal system and T.V.A. Consequently, their pipe casting and block machines must keep up steady, swift production of quality products.

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The photo shows a Neff & Fry Bin being erected alongside another which is completed.

A course of tongued and grooved staves has just been laid up and the steel hoops are being adjusted. Observe that the stave ends are diagonal. All stave ends in a horizontal joint are supported by a hoop, not possible if the staves were rectangular.

Between the joint hoops as many intervening hoops are installed as needed to effect a five-to-one safety factor.

Because of this unique construction, Neff & Fry Bins have extraordinary strength and durability. They last for decades with little or no maintenance expense. They do not spall, rot, rust, or burn.

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SUPER-CONCRETE STAVE STORAGE BINS

Shooting Rings

(Continued from page 198)

elapsed time may run from 1 to 2 hr. as a general rule. Many of the larger pieces of scale will break up into chunks a few inches in size as they are reheated. To open up a kiln with a fairly large ring may take from 1000 to 2000 shells. Generally they may be fired at a rate of about 1000 shells per hour, and faster with practice.

Safety Precautions

Two kinds of slugs may be used in shooting—either the 3-ounce lead or 2 and 3-ounce zinc. The zinc slug is effective on hard scale and is used to begin breaking up a ring. On soft scale and where a hard scale has been cracked, the lead slugs will do a good job.

In using zinc slugs it is especially important to aim shots carefully and use utmost caution due to their glancing off sloping surfaces and coming back out of the hood openings. This cannot be watched too carefully as an actual occurrence of this type has been observed. Generally, when shooting at any point not far back or where the surface is smooth, it is best to load, aim and step away from the opening before firing.

In using the kiln gun, a gunner and loader are needed. The rate of firing depends on the speed needed, but can be carried out at about 1000 shells per hr., or as fast as the loader can do his job. Both men should have protective hoods for flying lead and scale as well as heat protection. The gunner should wear safety glasses as well. Ear plugs are a necessity and may be of several types. Cotton is commonly used, although it is not fully effective. The slip-over type of pencil erasers give very good sound resistance. They must be shaped to the wearer's ears with a knife or sand-paper. Commercial devices include the Ear Defenders which are very good. The sound level may exceed 130 decibels. Other workers in the same immediate area should also be provided with ear protection.

The use of the kiln gun has been justified on a cost basis and even on hard rings can be paid for through operating savings. As a specific example, one particular kiln which operated for 7 to 10 days at a time, due to scale formation, was lengthened to 45 days and over without shutdown. Other kilns with average operating period of 50 to 60 days were lengthened to 150 days and over.

In evaluating savings from shooting several items must be considered:

(1) Fuel less in cooling and reheating of kiln in connection with a complete shut-down. The efficiency of burning must of necessity

(Continued on page 202)

At United States Gypsum's plant: "Belt reinforced with 'Cordura' rayon solves tough transportation problem"



Now Du Pont SUPER CORDURA makes belts even stronger

Whether to go around a hill with railroad track or road, or over it with aerial tramway, or through it with a belt conveyor was the problem faced by the engineers of United States Gypsum's Health, Montana, plant. They decided on a belt conveyor through the hill as most logical and most economical.

The belt, pictured above, was manufactured by Goodyear Tire & Rubber Company, on a carcass of Du Pont"Cordura"*high tenacity rayon.

Now there's a new, stronger reinforcement for conveyor belting — Du Pont" Super Cordura" high tenacity rayon. "Super Cordura" stretches even less in use and permits belts that are stronger and

more flexible. Downtime for take-up and resplicing is reduced to a minimum.

A product of Du Pont research, "Super Cordura" is 20% stronger than ordinary high tenacity rayon. You're assured of extra stretch re-

sistance . . . extra flexibility . . . top performance under the most rugged conditions of use. Write us for the names of suppliers. E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Dept., Room 11506 Nemours Bldg., Wilmington 98, Delaware.

*Du Pont's registered trade-mark for its high tenacity rayon yarny,

DU PONT Super Cordura
High Tenacity Rayon



BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY



· REMA is not just another cold patch. REMA is vulcanization by chemical process. The repaired area is sealed with an abrasive resistant cover stock patch. No heat or heavy vulcanizing equipment required. Here's the astonishing advantage-when repair work is completed belts may be returned to service immediately.

• REMA seals out moisture, reduces mildew, rot and deterioration great enemies of conveyor belts. Your own maintenance man can quickly repair your belt - it doesn't take a skilled belt mechanic to use REMA.

· Used for repair of all types of damaged spots, edge wear and for covering metallic joints. Available in introductory kits or parts separately.

Order from your Floxes-Alligator distributor Write for Folder No. R4

FLEXIBLE STEEL LACING CO. 4684 Lexington St., Chicago 44, III.

SELF-VULCANIZING

RUBBER REPAIR MATERIALS

ad when an empty and cold kiln is fired (
(2) Brick less due to temperature chang seluding spalling, rubbing wherever the lay be any distortion in the shell, and timount lost by adherence to the scale neved on the complete shut-down.

(3) Lest preduction fue to bringing a cell is back up to full loss after a complete shurence to the scale wern plue production lost during scale is the second of the second

(4) The many items of labor and mainten-

(5) On occasion a kiln shut-down may come at a very poor time as regards to meeting shipments and maintaining stocks on hand.

To get a complete picture of shooting scale versus complete shut-down, other factors may also enter. It must be evaluated by each operator.

Operating data show that when a kiln is laboring with a large ring, a shut-down of several hours will place it back on the line in condition for rapid pick-up to maximum production. For example, a kiln capable of 300 tons per day may drop off 270-280 when closing off, and after shooting go back in the space of hours to its normal production of 300 tons.

In most kiln operations that tonnage produced and sold above standard means a highly increased profit margin. If a kiln is rated at 8000 tons per month taking into consideration its operating efficiency with regard to scale rings and the plant can produce 9,000 or 10,000 tons through scale control, then the company is making money. Other items appear in the

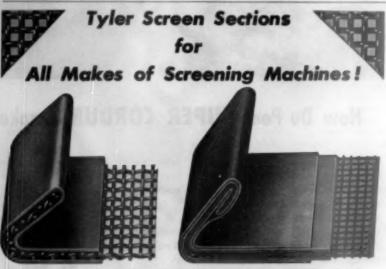
operating picture, such as maintenance, and amount of business available when a kiln can be improved in production. Supply of raw material, all equipment, and operating schedules may need revision or complete change.

The kiln gun provides an effective means of scale ring control. Operating conditions, nature of feed as regards fines and dirt, coal quality, and the actual burning and flame control are all items to be considered in retarding or preventing scale formation, which the gun can supplement.

Permanente Expanding

PERMANENTE CEMENT Co., Oakland, Calif., will boost production capacity 20 percent at its Permanente, Calif., plant by installing a sixth rotary kiln. The new kiln and related equipment, costing approximately \$4,-000,000, will add 1,400,000 bbl. to annual production, bringing total plant capacity to 8,400,000 bbl.

Other equipment necessary to complement the new kiln include additions to the plant's efficient electronic dust collecting system and clinker storage capacity of 200,000 bbl. and cement storage capacity of 15,000 bbl. The new facilities, which are being designed by Kaiser Engineers Division, Henry J. Kaiser Co., are scheduled to be put into production by mid-1956.



Screen sections of Tyler Woven Wire are fabricated for all makes of vibrating screens in any mesh or metal. They are made up with ook-strip or bent-edge construction to suit the machine on which they are to be used.

Tyler hook-strips make possible stretching and maintaining the screening at drum-head tension, which is essential for successful screening and long screen life.

TYLER COMPAN

CLEVELAND 14, OHIO

Manufacturers of Woven Wire Screens and Screening Machinery

LORAINS MAKE MONEY AT THE QUARRY FACE...

BUT LOOK HOW LORAINS
PRODUCE AT THE
STOCKPILE, TOO!

Rock products men well know how Lorain shovels can dig the toughest rock. But have you noticed the many types of Lorains doing many other kinds of jobs in quarries today? For example, here are three ways Lorains can be used to handle stockpiled materials. Each problem was different, but the wide assortment of mountings and front ends in the Lorain line made it possible for each quarry to fit its needs for highest output and lowest cost. It will pay you to make Lorains the standard for your plant, because no other line can fit your many needs so well. Ask your Thew-Lorain Distributor for a job analysis and cost-cutting recommendations!

LOADING BINS

This plant selected a Lorain-50 Clamshell, mounted on a 14-ft. long crawler, for loading bins. The Lorain uses a 1-yd. clamshell bucket on a 50-ft. boom to handle an average of 1400 tons of sand daily, both in building stockpiles and charging 130-ton bins.



TRUCK LOADING

Here's a special Lorain loading tool for crushed stone, sand or gravel. It's a Lorain-25 Scoop Shovel, equipped with a big 1½-yd. bucket for high capacity loading. Notice the horizontal thrust action of the bucket. It can crowd the bucket full, then revolve the turntable to dump the load without traveling the shovel.



SELECTED ORDERS

Is your problem one of "order picking" for selected deliveries . . . many frequent moves to different stockpile locations? This plant selected a mobile, 6 m.p.h. rubber-tire Lorain Self-Propelled Shovel, model SP-254W, to load from stockpiles as fast as trucks move in. Equipped with a 1-yd. shovel front end, here's a versatile tool that can dig at the quarry face, too.

THE THEW SHOVEL CO., Lordin, Ohio



THEW LORAIN



. with THESE **OFFICIAL** RESULTSI

Ul performance figures en and analyzed the Maryland State Inspector

Mesh	Concrete Sand	48" Oversize	Oversize	20' Bowl Oversize
36	180	100	ussing	
4	98	96		
-				
16	93	50	98	
8 16 30	93 67 49	84 50 27	98 74	99.5

were selected by the Contee Sand and Gravel Company of Laurel, Maryland, after thorough evaluation of other plant layouts and performance records.

The three-way split Contee required dictated the use of three Auto-Vortex Classifiers in series: a 48" Auto-Vortex CONE Classifier, to overflow excess minus 16 mesh material, a 72" CONE to overflow minus 50 mesh while discharging excess minus 16 plus 50 mesh for a mason sand product; and a 20' Auto-Vortex BOWL Classifier, to recover minus 50 and minus 100 mesh and overflow excess clay. The official figures above show how exactingly Contee's requirements are being delivered.

Centee's products, automatically discharged into storage bins equipped with dewatering columns, are loaded directly from the bins into trucks. This highly efficient sand gradation system is not only a low cost installation, but is almost entirely free of operating and maintenance costs, requiring only one 3 HP Motor to produce at the rate of 175 TPH.

Contee's is one of many economical operations wherein Auto-Vortex Classifiers have proved their reliability for multiple splits with two or more machines in series. Other Auto-Vortex plants in current use are reliably producing a single split with only one machine. Because of this adaptability to widely varying conditiens and requirements more and more sand producers are selecting Auto-Vortex Classifiers to solve their gradation problems . . . because Auto-Vortex Classifiers really "CLASSIFY!"



* Whatever your gradation problems, they can be solved economically. Call or write for our booklet on Auto-Vortex Cone and Bowl Sand Classification.

Lime Association Invites Foreign Companies

FOREIGN LIME MANUFACTURERS OF companies interested in lime can become affiliated with the National Lime Association, Washington 5, D. C. Currently 45 foreign lime companies from 17 countries are affiliated with the N.L.A. Each new affiliate will receive a complete set of 17 N.L.A. publications; any new literature that is subsequently published; the monthly publication, "Limeographs," consisting of market research on lime and individualized lime news items; and, lastly, reports on the association's research fellowships. The Association is expanding its overall budget 25 percent in its new fiscal year starting July 1, 1955. Most of this increase, or a total of \$60,000 per year, is being spent on research and market development activities. Research programs include:

(1) Fundamental research on lime at Mass. Inst. of Tech.

(2) Lime neutralization of waste acids at Rutgers Univ.

(3) Lime stabilization of roads at Univ. of Texas

(4) Lime treatment of oil wastes at Purdue Univ.

(5) Lime-fly ash stabilization of roads at Clarkson College

(6) Elasticity of lime mortars at Franklin Institute

(7) Construction and fundamental lime at National Bureau of Standards.

The cost of receiving this information is \$100 per year, payable in U.S. currency. Much of this research and market development program is just as valuable and applicable to foreign lime companies as it is to American companies. This information can be of real value in developing new lime markets and obtaining research leads on improving lime quality and analytical methods.

Oregon Cement Plant Expands

OREGON PORTLAND CEMENT Co., Portland, Ore., has announced plans to increase the capacity of its cement plant at Oswego, Ore., by approximately 50 percent, or about 700,000 bbl. of cement annually. The expansion is expected to cost over \$3,000,-000, and will include the addition of a 287 ft. long kiln, dust collection systems for the present kilns and for the new kiln. Unloading facilities, additional conveying, crushing and screening equipment, raw grinding, mills, slurry storage, finish grinding mill and additional storage for 50,000 bbl. of finished cement will also be included. Plans also call for the addition of a shovel, trucks, conveyors, bins, etc. at the company's quarry in Polk County, Ore., at a cost of about \$250,000.



Two 10 ton Bedford Bucket Cranes at Lehigh Portland Cement Company

The crane illustrated is one of two 10-ton 4-motor bucket type Bedford cranes at the Bunnell, Florida plant of Lehigh Portland Cement Company. The cranes have a 96-foot span and operate on a runway extending through the full length of the storage building and out over the raw material stockpile. They are equipped with 3 cu. yd. E-16 Hayward clam shell buckets.

Hoisting and holding motions speed; 225 fpm using two 125 hp motors. Trolley speed; 250 fpm using one 15 hp motor. Bridge speed; 450 fpm using one 100 hp motor. All motors are totally enclosed, wound rotor A. C. Crane type with 60 min. rating.

Hoisting and holding motion controls are E.C.&M. magnetic Contra-Torque type. Trolley and bridge motion controls are E.C.&M. magnetic reversing plugging type.

Bridge has Tool Steel Process tapered wheels. Spring bumpers are fitted on end trucks. Lintern sanders are furnished on bridge drive wheels.

All gearing is Tool Steel Process spur type in enclosed cases with oil bath lubrication. Farval centralized lubrication on bridge and trolley. Anti-friction bearings used throughout. All motor couplings are flexible type. All electric brakes are E.C.&M. W-B type with Wagner hydraulic type brakes on the bridge.

Write for catalogue describing Bedford cranes in detail.



New York Office: 30 Church St., Room 426 New York 7, N. Y., Phone Cortlands 7-1896

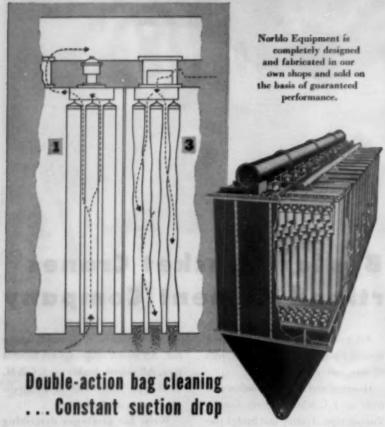
Pittsburgh Office: Oliver Building, Room 1141 Phone Atlantic 1-0136

BEDFORD FOUNDRY & MACHINE COMPANY, INC.

BEDFORD, INDIANA

ROCK PRODUCTS, August, 1955

gives you 24 hour-a-day DUST COLLECTION at full rated capacity



Norblo Automatic Bag Type Dust Collectors have proved the soundness of these operating principles for over 25 years:

- Basic unit compartment houses 78 cylindrical bags, fully distended by upward inside air flow.
- Variable cleaning cycle timing, adjusted to dust load, insures constant volume of air handled and constant pressure drop across arrester.
- 3. Shaking and cleaning involves only one compartment at a time. During short vigorous reciprocating shaking period, reversed air flow insures cleaning of bags but in no way interrupts suction drop.
- 4. Any compartment may be cut out alone, for bag repair.

 Write for Bulletin 164-3 giving full description.

The Northern Blower Company

Engineered Dust Collection Systems for All Industries 6408 Barberton Ave. Olympic 1-1300 Cleveland 3, Ohio

MANUFACTURERS NEWS

Stearns Mfg. Co., Inc., Adrian, Mich., has announced the appointment of Myron Hultmark as president and general manager. He was former-



Myron Hultmark

general manager. M. F. Ledford, sales manager since 1955, has been promoted to distribution manager, and John L. Tuttle, formerly assistant sales manager, has been named sales manager. David H. Densmore has been appointed sales representative in Georgia

ly vice-president and

sentative in Georgia and Florida, with headquarters in Jacksonville, Fla.

Mr. Hultmark, who joined Stearns in 1948, was educated at the University of Missouri. Subsequently he became associated with the American Aggregates Corp. in research and the development and promotion of Haydite lightweight aggregate. Later he was materials engineer for the Missouri State Highway Commission. During World War II, Mr. Hultmark was an industrial specialist of the concrete praducts division of the War Production Board, Washington, D.C.

Gar Wood Industries, Inc., Wayne, Mich., has announced the appointment of Milton G. Peek as vice-president and director of sales and adverthing, and Harold H. Hippier as general sales



Milton G. Pock



Harold H. Hippler

manager. Mr. Peck for the past four and onehalf years was sales manager of the electric industrial truck division of Clark Equipment Co., and for 26 years was sales manager of the industrial truck division of Yale & Towne Mfg. Co. Mr. Hippier, who has been associated with Gar Wood Industries since 1924, has been assistant director of sales and service administration.

The Torrington Ca., Torrington, Conn., announce that Milton E. Berglund, director and vice-president of manufacturing, has been elected executive vice-president. Lawence W. Smith, assistant to Mr. Berglund, succeeds him as vice-president of manufacturing. Theophil H. Mueller, assistant to the president, has been elected a director to succeed R. B. Nichola who resigned resently. Other appointments are Byron T. Virtue, vice-president of engineering; Edward B. Thompson, vice-president of sales; William R. Reid, Jr., assistant secretary and general sales manager; Floyd A. Pearce, director, vice-president of finance in addition to treasurer; Walter Hudson, assistant treasurer; and Ray E. White, controller.

Barber-Colman Co., Wheeleo Instruments Division, Rockford, Ill., announces that W. J. Parker has been transferred to the Cleveland office. He was formerly in the Rock Island office and will be succeeded by Russell Roderick. Thomas H. Beggin, formerly with the Indianapolis office, will now be associated with the Cleveland office. Robert N. Miller of the Wheeleo Chicago office, has been transferred to Los Angeles; Francis H. Beaupre, formerly of the Toronto office, is now located at Chicago, as is



"The big reason for our preference for AMSCO" equipment is the tremendous savings in down time . . ."



"We're well pleased since changing to Amsco," reports William D. Grimstead, plant superintendent at Holliday Sand & Gravel Co. "With our Amsco Pump, it takes us only four hours to change the impeller. With our previous equipment, it would take anywhere from a day to a day and a half."

Holliday uses a 10" heavy-duty Amsco Pump with Amsco pipeline fittings, including valves and elbows. The pipeline is 750 ft. long with an 87-ft. lift. The Swintek ladder on the dredge picks up a mixture of 90% sand and 10% gravel... loading 210 tons per average hour. According to Mr. Grimstead, they get an estimated 1700 hours of shell life during normal operation, and 800 hours from the impeller.

"I wouldn't think of ever buying anything but Amsco and I would recommend it most highly to anyone in the field," Mr. Grimstead concluded.

QUICK FACTS ABOUT AMSCO PUMPS

Whether your dredging operation is large or small, you can get an Amsco Pump for the job. There are 40 distinct Amsco Dredge Pump models—each type intended for a specific operating range, Standard sizes range from 6" to 20" discharge openings. Larger sizes are also available.

An Amsco Pump engineer will be glad to discuss your requirements. Write for Bulletin No. 1052P which includes specifications and additional information on the Amsco line of pumps.



AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, III.

Whatever the job... it can be done quicker—more profitably with OIAMUND ---

CRUSHING, SCREENING, WASHING and CONVEYING EQUIPMENT

Our catalogs fully describe the equipment that increases production and lowers costs. Get the facts now.

PORTABLE AND STATIONARY
CRUSHING PLANTS
CATALOG D-48A Quarry Plants
CATALOG D-104 Reter-Lift
CATALOG D-5415 "77" All American Plant
CATALOG D-103 Single Pass Gravel Plant

JAW CRUSHERS

ROLL CRUSHERS CATALOG D-5413

SCREENS AND WASHERS
CATALOG D-5412
Scalping and Scrubbing Screens
Vibrating Screens • Drag Washers

CONVEYORS
CATALOG D-5416
Pertable and Stationary Conveyors
Belt Conveyors Conveyor Rolls
Bucket Elevators

FEEDERS AND BINS
CATALOG D-101
Plate Feeders • Apron Feeders
Grizzlies • Bins and Hoppers

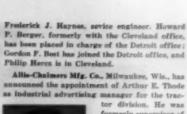
DIAMOND GENERAL LINE OF PRODUCTS CATALOG D-106

Write for name of your Diamond Distributor

DIAMOND IRON WORKS

GOODMAN MANUFACTURING COMPANY
Halsted Street and 48th Place Chicago 9, Illinois

Everything for the aggregate producer.





Arthur F. Thoda

tor division. He was formerly supervisor of fordustrial cales literature and has been with the company since 1929. R. B. Fulton, formerly a representative in the Cincinnati office, has been appointed manager of the Cincinnati district of the general machinery division.

Daly, who has retired after more than 30 years of service. Thomas B. Ross, formerly with Goodman Mfg. Co., has been made sales representative in the Charleston, W. Va., district, and A. I.. Stewart has been made regional representative for the crushing, cement and mining industries, with headquarters in Cleveland.

Adams Division, LeTourneau-Westinghouse Co., Indianapolis, Ind., announces that Le Roi mixers and agitators, formerly manufactured and sold by the Le Roi division, are now manufactured and sold by the Adams division and will be known as Westinghouse transit mixers. C. L. Bohmer, formerly with the Le Roi division, has been appointed manager of mixer sales with headquarters in Indianapolis.

Baldwin-Lima-Hamilton Corp., Lima, Ohio, announces that McCiure Kelley has been elected president of the company. He was executive vice-president and succeeds Marvin W. Smith, chairman of the executive committee, who continues as an executive officer. Robert G. Tabors and Arthur Clements were elected vice-presidents of the Hamilton division.

General Motors Corp., Detroit, Mich., announces that "General Motors Powerama" outdoor exposition will be held on Chicago's lakefront, August 31 through September 25. The exposition will portray the latest in land, air and marine equipment produced or powered by GM diesel, aircraft and heavy equipment divisions. Also on display will be Frigidaire's experimental "Kitchen of Tomorrow."

Syntron Co., Homer City, Penn., has named Donald J. O'Hara as sales representative for Syntron Boston Sales Co. in Maine, New Hampshire and northern Massachusetts. James Mechan has been transferred to Syntron Irvin Sales Co., Indians, Penn., and Bernard Wieczorek will handle sales of the Syntron Cleveland Sales Co. in the Cleveland area. Areas Solokian and John R. Skelton have been appointed to the Syntron Newark Sales Co. staff.

American Brake Shoe Co., New York, N. Y., has elected William C. Denison to the board of directors. Mr. Denison is president of the Denison Engineering Co., which was recently purchased by American Brake Shoe Co. William J. Grant has been appointed southern sales manager for railroad products for the national bearing, southern wheel, and brake shoe and castings divisions, with headquarters in Norfolk, Va.

Harnischfeger Corp., Milwaukee, Wis., announces that James C. Huntington has been appointed district manager in the New York office. He succeeds Robert Grant who has resigned to enter into partnership with Johnson & Dealaman, Inc., P&H power crane and shovel distributors in Newark, N. J.

The Fexbere Ce., Foxboro, Mass., has established the following regional sales offices and appointed the following regional managers, under the direction of H. O. Ehrisman as gen-



This Tough, Trouble-Free Belt Takes Heavy Loads in Stride

Here's an economical, tough belt for hauling heavy loads of coal, ores or aggregates in operations where long conveyor centers are necessary. Its troughability is good and its fastener holding is superb.

A sturdy, multiple-ply, rayon duck carcass makes this belt lighter and thinner than cotton-carcass belts of comparable strength. Skim coats between plies insure perfect bonding.

Like other heavy duty belts,

these LOADLINER belts are custom made to meet particular requirements of individual jobs—unlimited length, widths to 72". They can be made with a cover tensile strength of 3500 to 4000 pounds average and a friction pull of 20 to 24 pounds; or with a cover tensile strength of 2500 to 3000 pounds and a friction pull of 16 to 19 pounds; also available in oilresistant Neoprene. All are mildew inhibited throughout. A

breaker strip can be included in top cover, if specified.

We also manufacture a complete line of industrial rubber products: belting, hose, packing and moulded rubber of every construction for every need. Through your Quaker and Quaker Pioneer distributor our research and engineering services are always available to help you solve any industrial rubber problem. Write for name of nearest distributor.

QUAKER RUBBER CORPORATION

Philadelphia 24, Pennsylvania



QUAKER PIONEER RUBBER MILLS

San Francisco 7, California

BRIDGE FOR WATER



When it comes to handling water, large diameter Naylor lightweight pipe can be depended upon to bridge the gap over any terrain. For water supply, for discharge, for tailings, for hydraulicking, Naylor pipe offers the economy of lightweight along with extra strength and safety required for long dependable service. Couple this pipe with the one-piece Naylor Wedge-Lock coupling and you have the perfect pipe line combination for easy handling and quick installation. Sizes from 4" to 30" in diameter with all types of fittings and connections.

Write for Bulletins No. 507 and No. 513.



1237 East 92nd Street, Chicago 19, Illinois Eastern U. S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

eral sales manager and J. J. Burnett as field sales manager: New England, H. H. Michelmore; New York, E. R. Huckman; Philadelphia, J. B. Deaderick; Pittsburgh, A. H. Shafer; Atlanta, E. W. Prendergast; Cloveland, H. L. Lee; Chicago, J. J. Connelly; Dallas, E. L. Stark; Houston, L. W. Parten; and San Francisco, R. E. Rogers.

The Dart Truck Co., Kansas City, Mo., announces the election of George F. Dixon, Jr., as president of the firm, succeeding Furber Mar-



George F. Dixon, J.

shall, who has been named chairman of the board. Mr. Marshall is also president of the Carlisle Corp.,
Carlisle, Penn., of which Dart Truck Co. is a subsidiary. Mr. Dixon is a graduate of the U. S. Military of the U. S. Military academy at West Point and received his master's degree at Cornell University

and his doctor's degree as a Freeman Fellow at the University of Greenble. For the past year and a half, Mr. Dixon has served as vice-president of the Carlisle Corp.

The Raymond Bag Co., Middletown, Ohio, has announced the election of W. F. Lawrence as chairman of the board. He has been serving as president since 1930 and will be succeeded by Clarence L. Mers, vice-president and general manager since 1952. James H. Lawrence, secretary and treasurer, has been appointed vice-president and secretary, and William G. Shaw, comptroller, has been named treasurer.

The Baker-Raulang Co., Cleveland, Ohio, has announced plans to close the Bloomington, Minn., plant of the Baker-Lull division on or about September 30 and to transfer the manufacturing and service operations to the Cleveland plant.

Worthington Corp., Harrison, N. J., has announced the appointment of William J. Davies adiatriet manager of the Cleveland office. He was formerly sales engineer at Cleveland and succeeds Robert J. Laidlaw, who has retired for reasons of health.

Butler Bin Co., Milwaukee, Wis., announces that Kenneth P. Kerr, vice-president in charge of sales, was re-elected chairman of the Manufacturers Division of the National Concrete Masonry Association at its recent convention in Cleveland.

Clark Equipment Ce., Buchanan, Mich., announces that Robert C. Andrews has been appointed sales manager of the axle division. For the past 15 years Mr. Andrews was with Vickers, Inc., in production, sales and sales coordinating southearing.

Iewa Mfg. Co., Cedar Rapids, Iowa, announces the appointment of R. C. Gregor as district sales representative in Utah, Wyoming, Montana, Colorado and the Canadian provinces of Alberta and Saskatchewan, with headquarters in Salt Lake City, Utah.

Jey Mfg. Co., Pittaburgh, Penn., has appointed L. G. Felderman as sales manager, rock mechanization, with headquarters at the Franklin, Penn., plant. He was formerly manager of sales engineering.

Marion Power Shovel Co., Marion, Ohio, has appointed the Wesver Trailer & Body Co., Columbus, Ohio, as distributor in central and southern Ohio.

The Babcock & Wilcox Cs., New York, N. Y., announces that M. Nielsen, vice-president and director, has been elected executive vice-president.

Atlas Pewder Ca., Wilmington, Del., announces the sudden death on June 12 of Harry L. Meat, director of production since 1964. He was 58 years old and had been with the company

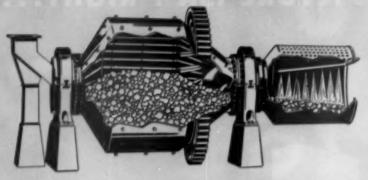


Sales, parts and service throughout the notion

Heavy duty power for rock crushing

Murphy Diesel Engines and Power Units are available in sizes from 96 to 246 M.P. Engine speeds are 1200 and 1400 rpm. "Packaged" generating units are available with capacities ranging from 60 to 155 K.W.

HARDINGE SCRUBBERS FOR PIT-RUN MATERIALS

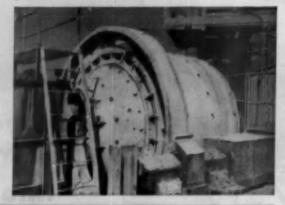


Large diameter, short length trunnions permit chute feeding of unsized ore and rock at rates up to 600 tons per hour.

The mass loading and ball-

mill action in the scrubber quickly and completely slurries the clay and dirt, permitting ready separation on washing screens or trommels.

View of a 10' x 66"
Hardinge Scrubber cleaning crushed dolomite in a California plant.



BULLETIN 37-A-7

HARDINGE COMPANY, INCORPORATED

YORE, PENNSYLVANIA • 240 Arch St. • Main Office and Works
New York • Toronto • Chicago • Hibbing • Houston • Salt Lake City • San Francisco



since 1918, starting in the explosives experimental laboratory at Perryville, Md., and transferring in 1981 to the explosives department in Wilmington.

The Jacger Machine Ca., Columbus, Ohio, has announced the appointment of A. C. Thomas as assistant general sales manager. He was formerly sales manager of the truck division, and will be succeeded by Emil L.





Emil L. Baugh

A. C. Thomas

Baugh, who has been southeastern district sales representative for the past 10 years. R. E. Fowler, special field representative, succeeds Mr. Baugh as southeastern representative. Mr. Thomas has been associated with sales promotion and sales at Jaeger since 1940 and has directed truck mixer sales since 1948. He is also currently serving as chairman of the Truck Mixer Manufacturers Bureau, Washington, D.C.

Nopee Chemical Co., Harrison, N. J., has named G. Daniel Davis as executive vice-president in charge of the industrial division including sales, production and product development. He has been with the firm since 1916. He was appointed a member of the board and secretary in 1923 and became a vice-president in 1937.

Timken Roller Bearing Co., Canton, Ohio, received a citation at the recent annual awards meeting of the American Society for Materials Handling for the beat installation of a materials handling system in production in northeastern Ohio.

The Cleveland Crane & Engineering Co., Wickliffe, Ohio, has started excavation for a new 3300,000 engineering building to house engineers and draftamen for designing overhead traveling cranes, Tramrall overhead materials handling equipment, Steelweld bending presses, heavy power presses and metal-cutting shears.

Jeseph T. Ryerson & Son, Inc., a whollyowned subsidiary of Inland Steel Co., Chicago, Ill., has acquired the plant and stocks of Arthur C. Harvey Co., Boston, Mass., steel and aluminum distributor.

Arneld O. Beckman, Inc., Los Angeles, Cailf., manufacturers of oxygen analyzers, anounces the promotion of S. C. Danforth to sales promotion manager, and the formation of a custom products department, for specialized development work, headed by Robert W. Negue.

Johns-Manville Corp., New York., N. Y., has announced the appointment of Edward D. Flavin as vice-president of Johns-Manville Sales Corp. and manager of special industries, industrial products division. He succeeds L. A. Baldwin, who has retired after 35 years of service.

Cleaver-Brooks Co., Milwaukee, Wis., has appointed the Delvai Equipment Corp., Philadelphia, Penn., as sales representative in Delaware, castern Maryland, southern New Jersey and eastern Pennsylvania.

Allegheny Ludium Steel Corp., Pittsburgh, Penn., has announced the appointment of Richard J. Swan as director of sales, magnetic and electronic materials, and Milton M. Fenner, Jr., as director of sales, tool and die steels. Mr. Swan was formerly Pacific Coast area manager in Los Angeles and will be succeeded by Karl A.

ROCK

PRODUCTS

FEATURES

INDUSTRY

TIMELY

NEWS

EACH

ISSUE

There's A SYNTRON SCREEN

for better results on every industrial application



vibratory design, Syntron has perfected a complete line of screens for big tonnage efficiency on any type of screening operation. It will pay you to make Syntron the headquarters for your screening equipment.

Double-Deck VIBRATING SCREENS



Compulsory driven, swinging mass, dual-deck screens for separating heavy loads of ores, coarse ag-gregate, shake - out sand, etc. Provide increased screening surface in the same floor space.

Bar-type, electromagnetic Grizzlies for heavy tonnage Sartype, electromagnetic ordering for heavy tomage scalping or coarse sizing and feeding in one operation. Controllable speed vibration—no mechanical wearing parts. Vibra-flow principle prevents clogging of tapered, wear resistant grissly bars. Models for any size operation.

VIBRA-FLOW SCREENING FEEDERS

Compact heavy duty Screening Feeders for continuous operation on dewatering, desludging and desilting operations. Bar or wire type screening surfaces—controllable, electromagnetic power.



Syntron-Sinex VIBRATING SCREEN



Driven by a pressure tight, waterproof eccentric vibrator eccentric vibrator these screens pro-vide high speed, uniform sizing and dewatering. Single or double deck, suspension type models with replaceable screening surfaces.

PULSATING MAGNET VIBRATING SCREENS

Pulsating, high speed screens that assure positive, variable speed vi-bration of the entire screening surface. For dur-able scalping and rough sizing operations with low cost installation.



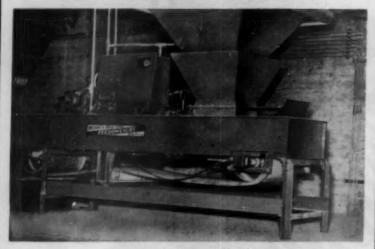
Write for complete catalogue data - Free



SYNTRON COMPANY

450 Lexington Avenue

MERRICK KEEPS PACE WITH CEMENT'S GROWTH



America's growing demand for the "miracle ingredient" finds more and more cement mills depending on the FEEDOWEIGHT to insure accurate, continuous blending and proportioning (by weight) of the materials and mixes in modern cement formulation.

FEEDOWEIGHTS give you a consistently uniform product, with maximum accuracy and operational dependability.

Write today for details

. . . and when you're planning expansion of your processing plant, think also of Merrick's WEIGHTOMETER . . . for continuous and automatic weighing of any material conveyed by belt.

MERRICK SCALE MFG. CO.

180 AUTUMN STREET . PASSAIC, NEW JERSEY

This "No Contact" feature
REDUCES
UP HEEP
\$ \$ \$.
SAVES YOU
MONEY

In a Hayward, there's no contact between the closing mechanism and the material handled. This means much less wear, reduced upkeep, big savings in bucket maintenance. THE HAYWARD COMPANY, 50 Church St., New York 7, N.Y.

HAYWARD BUCKETS

CLAM SHELL . ELECTRIC . ORANGE PEEL . GRAPPLES famous for performance since 1888

ABREAST
WITH
INDUSTRY
TRENDS
THROUGH
ROCK
PRODUCTS

Elers, manager of product development and engineering service. Mr. Fenner formerly served as tool steel product manager and will be succeeded by Irving R. Leheney, assistant product manager.

Cleaver-Brocks Co., Milwankee, Wis., has appointed Ruffridge-Johnson Equipment, Inc., Minneapolis, Minn., as distributor in the eastern two-thirds of Minnesota and 14 counties in northwest Wisconsin.

General Motors Corp., Detroit, Mich., has announced the appointment of Semon E. Knudsen, as general manager of the Detroit diesel division. Son of the late William S. Knudsen, president of General Motors from 1927 to 1846. Mr. Knudsen succeeds William T. Crowe, who has retired after 35 years of service.

American Air Filter Co., Inc., Louisville, Ky., has opened a new branch office in Denver, Colo., to handle the sale of Horman Nelson heating and ventilating equipment in Colorado and Wyoming. Cyril DiMercurio has been appointed manager of the office.

Chase Bag Co., Chicago, Ill., announces that Jim Jackson, sales representative in the St. Louis area, an amateur golf star, has been named to the United States Walker Cup team for his second consecutive year.

Blaw-Knox Co., Pittsburgh, Penn., announces that Robert P. McKenriek, vice-president and general manager of the construction equipment division, has been re-elected chairman of the Manufacturers Division of the National Sand and Gravel Association, and will also serve on the board of directors of the Association.

Galion Allsteel Body Co., Galion, Ohio, has appointed the Acme Spring & Equipment Co., Columbus, Ohio, as distributor in central and southern Ohio.

International Harvester Co., Chicago, Ill., has appointed Metalweld, Inc., construction equipment division, Philadelphia, Penn., as distributor in eastern Pennsylvania, southern New Jersey and Northern Delaware.

Baldwin-Lima-Hamilton Corp., construction equipment div., Lima, Ohio, announces the appointment of N. C. Ribble Co., Albuquerque, N. M., as distributor in the state of New Mexico with the exception of the seven extreme aouthern border counties.

American Cyanamid Co., New York, N. Y., announces that Howard R. Houston has retired as vice-president and director but will continue to serve as a consultant.

H. K. Perter Co., Inc., New York, N. Y., has announced the appointment of H. A. Wiley, Jr., as manager, belting and packing sales, Quaker Pioneer Rubber Mills, San Francisco, Call.

Buffalo Steel Corp., Tonawanda, N. Y., has announced the appointment of W. Roy Willard as assistant to A. E. Klinger, president of the company. He was formerly with Republic Steel Corp.

Ajax Flexible Coupling Co., Inc., Wentfield, N. Y., announces election of the following officers: Wayne Belden, president; Charles W. Belden, vice-president; Harley E. Northrop, treasurer, and Robert G. Cady, secretary.

Calorado Fuel & Iron Corp., New York, N. Y., announces that Paul L. Gallagher has been appointed manager of pipe sales for the Claymont steel products department in Wilmington, Del.

B. F. Goodrich Co., Akron, Ohio, has elected Elmer L. Lindseth to the board of directors. He is president of The Cleveland Electric Illuminating Co., Cleveland, Ohio.

Marmon-Herrington Co., Inc., Indianapolis, Ind., has announced purchase of substantially all of the common stock of the Cardox Corp.,

(Continued on page 218)

MONEY MAKERS IN YOUR SHOVELS AND DRAGLINES ...







EQUALLY PROFITABLE IN ALL YOUR OTHER EQUIPME







When leading Shovel and Dragline builders pick Buda Diesels to power their equipment they choose them for good reasons: -longer life, lower operating cost-minimum maintenance . . . more power . . . greater torque ... extensive parts & service.

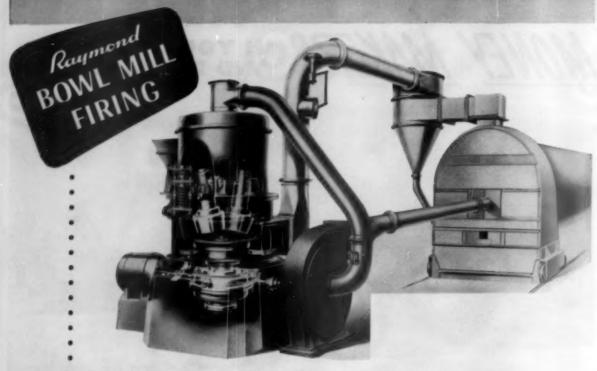
These same money-making advantages of Buda Diesels can be applied to almost every other piece of construction equipment you own. Don't miss a chance to repower with Buda Diesels . . . they're designed with your profits in mind.



ALLIS-CHALMERS

HARVEY ILLINOIS

Install RAYMOND EQUIPMENT for



You can modernize your rotary kiln operation with the Raymond Bowl Mill. This efficient direct firing unit not only gives economical coal pulverizing but also insures a proper coal-air mixture to the burner for maximum kiln performance.

The Bowl Mill provides a complete, fully coordinated system with flexible control and automatic operation. Its special advantages pay dividends in extra savings and improved cement production:

Handles coal of any grade or moisture content Easily adjusted or lubricated while operating Sturdily built for continuous 24-hour operation High availability, and wide range capacity

In hundreds of installations, the Bowl Mill is proving itself as dependable equipment for all types of rotary kilns . . . cement, lime, dolomite and aggregate, as well as for industrial furnaces.



VISUAL CONTROL STATION gives a con-tinuous picture of the Bowl Mill operation.



Write for New Raymond **Bowl Mill Catalog #75**

PRINCIPAL CITIES COMBUSTION

RAYMOND DIVISION

Top Quality CEMENT PRODUCTION

Raymond WHIZZER SEPARATION

ANTI-FECTION MARNOS

UPPER WHIZZER

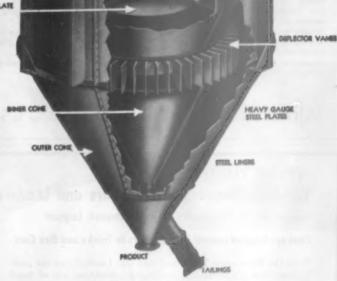
LOWER WHIZZER

DETRIBUTOR FLATE

RAYMOND Mechanical Air Separators with the patented whizzer leature are doing an outstanding job in the classification of both raw mix and cement clinker.

Whizzer separation gives close control over the finished product, and consistently uniform materials are readily obtained at any desired fineness or specific surface area. With the proper setting of the separator, the slide damper controls can be adjusted externally to provide any fineness specification from standard Portland to high early strength cements.

The resulting increased output and more efficient plant operation make the Raymond Whizzer Separator an important factor for improving cement production and reducing the per-barrel cost of any grade you produce.



CONSTRUCTION FEATURES

Sturdily built and precision made in all details with protective liners at wear points . . . for long service and low maintenance.



FOR CLOSED CIRCUIT GRINDING

The Raymond Whizzer Separator is a vital "link" in your production line for maintaining uniformity, boosting capacity and insuring economy.

Write for Raymond Separator Bulletin

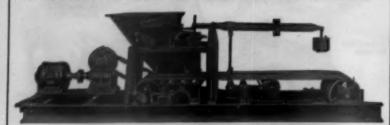


ENGINEERING, INC.

1307 NORTH BRANCH STREET, CHICAGO 22, ILLINOIS

Combustion Engineering-Superheater, Ltd. Montreal, Canada

MIX - RECORD - PROPORTION with SCHAFFER POIDOMETERS



1400 NOW SERVING INDUSTRY

Years on-the-job prove your production goes up . . . costs go down when you install super-service Schaffer Poidometers.

For weighing, blending, feeding, mixing, recording or proportioning, Poidometers improve product uniformity . . . cut labor and machine costs.

What's your scaling problem? Schaffer Poidometers perferm a wide variety of scaling functions for handlers of raw and finished bulk materials. Let us give you complete details on this production-booster today.

Available with total weight recorders, and remote controls for showing and changing feed rate.

Write for latest CATALOG No. 6

SCHAFFER POIDOMETER CO.

2828 Smallman Ave., Pittsburgh 22, Pa. Chicage, Ill., manufacturers of agricultural equipment, chemicals, mining equipment and fire-fighting equipment, which will be operated as a separate corporation. Present executives of Cardox will remain under Marmon-Herrington direction.

Bemis Bro. Bag Co., St. Louis, Mo., has established a new line of products to be known as "Tekmoid Products." R. R. L. LeRoy, sales manager of the East Pepperell, Mass., multiwall paper bag plant, is in charge of the new department.

The Hays Corp., Michigan City, Ind., has elected Orval W. Riggs, formerly sales manager, as vice-president in charge of sales, and appointed Louis E. Hapke as controller, in addition to serving as assistant secretary-treasurer.

General Electric Co., Detroit, Mich., has appointed the Harris Hardware & Supply Co., Inc., Kingston, Penn., as distributor for the carboloy department.

Fairbanks, Morse & Co., Chicago, Ill., has elected L. R. Gaiennie, formerly director of personnel, as vice-president of personnel.

Dewey & Almy Chemical Co., Cambridge, Mass., division of W. R. Grace & Co., announces the appointment of John Fusek as advertising manager. He has been with the company since 1950.

The Galion Allsteel Body Co., Galion, Ohio, amsounces the appointment of C & M Equipment Co., Minneapolis, Minn., as distributors in the state of Minnesota.

Peor & Co., Chicago, Ill., has announced the election of Max K. Ruppert as executive vice-president, and Eugene C. Bauer, Jr., as vice-president. Mr. Ruppert, formerly first vice-president, is president of the P. & M. Co., and Eugene C. Bauer, Jr., is president of Kensington Steel Co., both subsidiaries of Poor & Co. V.

IN CEMENT PLANTS ...

Versatile Flexoveyor Conveyors and Loaders Adaptable to Practically any Packhouse Layout

Conveys bagged cement from Packers to Trucks and Box Cars.

With the Flexoveyor Truck and Box Car Loaders you can push buttons and eliminate the costly, back-breaking job of hand wheeling heavily loaded trucks.

Flexoveyor Packer Conveyor with its self-cleaning features, minimum headroom requirements and freedom from breakdowns can establish new records of performance in your packhouse operation.

Flexoveyor equipment has been proved by repeat orders from large cement producers. It is the *original* spring belt flexible power conveyor consisting of a series of endless steel spring belts operating over grooved steel rolls.

Without obligation, we design and engineer to your specific hag handling conditions; Louders, Conveyors, Bay Flatteners and Elevators.

WRITE FOR BULLETINS showing pictures, specifications and drawings



MANUFACTURING COMPANY

Originators of Flexoveyor Type Conveyors. Specialists in Conveying, Loading and Flattening Bagged Material 1220 South Acomo Street Denver 23, Colorado



PLEXOVEYOR PACKER-CONVEYOR in large cement plant receives bags from bag filling machine than discharges them to telescoping Flexoveyor Truck Loader.



Substantial savings are realized by cement mill operators using ABK Metal liners in primary, secondary or tertiary compartments for wet or dry grinding of raw stone or finished product.

Extended liner life of as high as 3 or 4 times can be expected when ABK Metal replaces ordinary iron liners. That's because of the extreme hardness (500 to 700 Brinell, as required)

and very high resistance to abrasion that is characteristic of every ABK Metal casting. A nickel-chrome iron of controlled structure, ABK Metal is produced only by Brake Shoe.

Why let abrasion steal your operating dollars. Specify ABK Metal castings...cut your replacement, maintenance and downtime costs and increase your grinding mills' efficiency.

QUALITY CASTINGS IN

ABK METAL ABSCO METAL



Baltimore • Chicago • Houston • St. Louis • San Francisco • Superior • Toledo

BRAKE SHOE AND CASTINGS DIVISION

230 Park Avenue, New York 17, N. Y.

MORE ECONOMICAL BREAKAGE



2000 TO 12000 LBS.

FORGED STEEL DROP BALL

HIGHLY EFFICIENT SECONDARY BREAKAGE MEANS—MORE TONNAGE—MORE PROFITS

The "Cape Ann" Forged Steel Drop Ball is noted for its long life and better wearing qualities for use in secondary breakage. It is "TOPS" in the drop ball field where constant pounding day in and day out make it absolutely necessary that ruggedness and dependability be the key factor to insure maximum production.

NO DELAYS ... WE SHIP IMMEDIATELY

WRITE FOR PRICES AND INFORMATION

CAPE ANN ANCHOR & FORGE CO.
Post Office Box 360 Gloucester, Mass.

C. Armstrong continues as director and chairman of the board, and Eugene C. Bauer as director, president and chief executive officer. Richard A. McLaughlin has been appointed vice-president of the Canton forge and axle works division.

American Tractor Corp., Churubusco (Ft. Wayne), Ind., has released a 15-min. color movie film showing on-the-job applications of the TerraTrac crawler-mounted M-3 fork lift, including the lift extension for carrying and placing loads of concrete block, brisk, steel, roofing, etc.

Barber-Greens Co., Aurora, Ill., has appointed James E. Gleason as conveyor engineer in the New York office. He has been working on belt conveyor job layout and design for installations at the Aurora office.

Symons Clamp & Mfg. Ca., Chicago, Ill., has opened a sales office and warehouse in St. Louis Park, Minn., with Lyle Schoffman as sales manager.

Bergen Machine & Teel Co., Inc., Nutley, N. J., announces the appointment of Bob Elwood as sales representative in the state of Pennsylvania.

Huber-Wares Co., Marion, Ohio, has appointed the Foulger Equipment Co., Salt Lake City, Utah, and Euclid-Arkaness, Inc., Little Rock, Ark., as distributors.

Detroit Dissel Engine Division, General Motors Corp., Detroit, Mich., has appointed Royce A. Hill as manager of the Florida branch to succeed the late E. G. Duerk who passed away in Mar.

Grance Steel Products Co., St. Louis, Mo., has appointed Paul K. Nichols as general manager, according to an announcement by John N. Marshall, chairman of the board and president of Grante City Steel Co., of which Granco is a subsidiary.

Rotary
DRYERS
COOLERS
KILNS

Increase the capacity and efficiency of your plant

McDERMOTT BROS. CO.

THIRD AND WASHINGTON STS.

ALLENTOWN, PENNA.

Established 1895

WRITE for facts on ORTON Air-Conditioning will make your operators as efficient at the end, as at the beginning of the shift.

WRITE for facts on ORTON Air-Conditioning of the shift.

WRITE for facts on ORTON Air-Conditioning of the shift.

Working in a cement plant,

I like the



DART 20-S - 20 ton Truck being loaded by 5 yard shovel at quarry of Lone Star Cement Corp., Bonner Springs, Kansas.

DART speeds production



waste motion, less time lost, with the DART 20-S. DART engineering has resulted in a truck with turning radius approximately the same as the average passenger car. That makes possible quick spotting at the shovel in tight quarters. Also, twin, single-stage double-acting hoists raise the body to maximum dump position in approximately 15 seconds. 225 HP Diesel with torque converter drive (which is optional) means faster starts and greater availability. All these factors add up to FASTER... more PROFITABLE... performance.

DART ENGINEERS CAN HELP YOU SOLVE YOUR HAULAGE PROBLEM.

D-100

MORE CYCLES PER HOUR . . . those twin, double acting hoists dump the load fast and clean. Note the short wheelbase which helps make the DART 20-S so maneuverable in close quarters.



LET YOUR DART DEALER GIVE YOU PERFORMANCE FACTS ON DART OFF-HIGHWAY TRUCKS

ATLANTA, GA,-W. C. Caye Co.

BIRMINGHAM, ALA.—Leary and Owens Machinery Co., Inc.

BISBEE, ARIZONA—Goar Service and Supply Co. CHARLESTON, W. VA.—West Virginia Tractor and Equip. Co.

CINCINNATI, OHIO—Carroll and Edwards Co. CLEVELAND, OHIO—Cleveland Contractors Equip. Co.

DALLAS, TEX.—Lumby Machinery Co.
DENVER, COLO.—Western Machinery Co.
DETROIT, MICH.—W. H. Anderson Co.

DULUTH, MINN.—Lake Shore Eng. Co.

HARTFORD, CONN.—R. W. Thompson Co.

KANSAS CITY, MO.—Funkhouser Equip. Co.
LOS ANGELES, CALIF.—Smith-Booth-Usher Co.

MADISONVILLE, KY.—Minton Machinery Co.

MILWAUKEE, WISC.—J. P. Waite, Inc.

MILWAUREE, WISC.—J. P. Waite, Inc.

NASHVILLE, TENN.—McCarthy-Jones and
Woodard Co.

NEWTON HIGHLANDS, MASS.—Powered Equip.

OAK LAWN, ILLINOIS—Tractor and Equip. Co.
OAKLAND, CALIF.—C. H. Grant Co.
PHILADELPHIA, PA.—Service Supply Corp.
PITTSBURGH, PA.—Anderson Equip. Co.

PORTLAND, ORE.—Balzar Machinery Co.
PRESCOTT, ARIZONA—Prescott Tractor Sales, Inc.
RDANGKE, VA.—Southern Machinery Co.
ST. LOUIS, MO.—Bardale Equip. Co.
SALT LAKE CITY, UTAH—Arnold Machinery Co.
SEATTLE, WASH.—Bow Lake Equip. Co.
TORONTO, ONTARIO, CANADA—Federal Equip.
Supplies, Ltd.

UTICA, N. Y .- Credie Equip., Inc.

WEST COLUMBIA, S. C.—State Machinery and Supply Co., Inc.

WINSTON SALEM, N. C .- J. W. Burress Co.

MORE AND MORE CEMENT PLANTS USE BLAW-KNOX BUCKETS

to meet the stepped-up requirements in handling CLAY · LIMESTONE · CEMENT CLINKER

Blaw-Knox bucket engineers have had many years of worldwide experience in the design and application of buckets for the cement industry.

This expert engineering service is available to you without obligation for the purpose of analyzing your operating problems and helping you select the proper size, weight and type bucket to meet your stepped-up requirements.

In all probability, we have already had experience in solving problems that may be puzzling you. Write for this free service.

Write for Bulletin 2378 for complete information, construction details and specifications.



Size 720-S rated 11/4 yd. BLAW-KNOX Bucket Handling Limestone and Clay.



BLAW-KNOX COMPANY
BLAW-KHOX EQUIPMENT DIVISION
Department 354
PITTSBURGH 38, PA.
Offices in Principal Cities

BLAW-KNOX CLAMSHELL BUCKETS
FOR THE CEMENT INDUSTRY

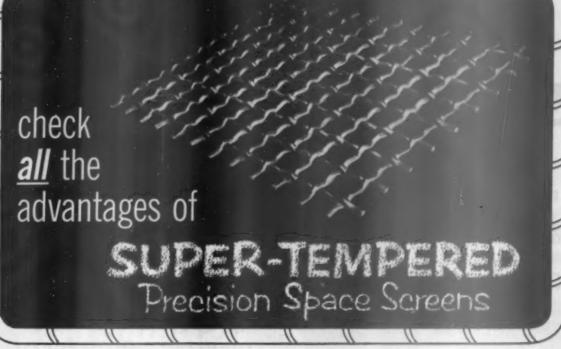
Rebuild Your Crusher Plates with two-tone Manga-tone N.M.

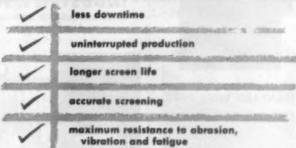
Does it make sense to throw away 90% of a manganese plate, just because the rock-producing corrugations are gone? It isn't necessary any more — in fact, it is sheer waste. Your crusher plates can be rebuilt economically with TWO-TONE MANGA-TONE N.M. in any regular Two-Tone Shop. THEY WILL LAST LONGER THAN NEW PLATES. They will fit your crusher "like a die." Every plate guaranteed.

This is an actual unretouched photograph. See how perfectly the plate has been rebuilt. Call in our field man and let us rebuild one for you.



RESISTO-LOY CO. INC., Mfrs. . . Grand Rapids 7, Michigan





Here's why these screens assure maximum screen life and biggest savings for you:

They are made from special super-tempered wire heated red hot and quenched in oil to give extreme hardness. Then they're tempered in molten lead to obtain the toughest structure possible. Finally, the wire is crimped to precision standards and woven extra tightly on heavy-duty hydraulic looms to insure accurate, uniform spacing under the severest vibration.

This superior screen will give you peak performance on even your most demanding jobs. To order, write or phone your requirements to our nearest sales office.

THE COLORADO FUEL AND HIGH CORPORATION—Denver and Onkland WICKWIRE SPENCER STEEL DIVISION—Arients - Boston - Buffale Chicago - Defroit - How Orleans - New York - Philodolphia

SUPER-TEMPERED

PRECISION SPACE SCREENS

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION THE COLORADO FUEL AND IRON CORPORATION



223

NOT QUITE **FOREVER**

But Almost

THAT'S THE LIFETIME OF STANDARD **ELEVATING AND CONVEYING EQUIPMENT**

CONTINUOUS ELEVATOR BUCKET STYLE No. 2

Put this Standard Bucket to work handling the toughest materials, and it takes the job right in stride-resisting abrasion, corrosion and wear. This bucket is typical of the complete line of low cost, rugged Standard Steel Bucketa - available in Salem, Style "A," shelf type and other continuous style buck-





STANDARD WING TYPE SELF-CLEANING PULLEY

The most severe operating conditions won't bother this Standard Pulley because its all-steel welded construction gives it far greater strength and resistance to breaking. And yet it weighs less . . costs less.

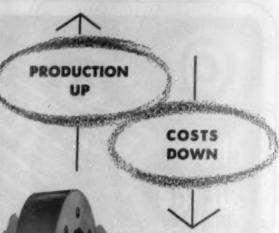
STANDARD BIN GATE

Profit from faster, easier material handling made possible by this gear-operated all-steel Standard Bin Gate. Other styles in Standard Bin Gates also available.



For lower maintenance and material haccests, convert to Standard. Write toda catalog showing the complete Standard

STANDARD METAL MFG. CO. 110 CENTER ST.



acf

and

builders

equipment

industries

CHILL HARDENED ROLLERS

For grinding, crushing, pulverizing and many other operations, cast from standard wheel mixture ... in a complete range of sizes.

NI-HARD' ROLLERS-

now available in many types and sizes.

*T. R. International Nickel Co.

INDUSTRIES, INCORPORATED

INDUSTRIAL PRODUCTS DIVISION, 30 Church St., New York 8, N.Y.

Conveyors

BULK material conveyors built by McNally Pittsburg are tough, wear resistant, geared for heavy loads and specifically designed for the job you require.

For Basic Industries McNally Pittsburg offers:

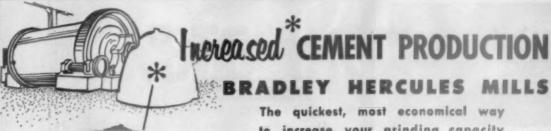
- RERVICES -Research & Development
Engineering Design Field Erection - EQUIPMENT -

Hucket Elevators Car Hauls, Dumpers Pumps, Valves, Piping Dryers, centrifugal & heat Washers, heavy media & jig

Conveyors Pug Mills Crushers

VALLY PITTSBURG

First Notional Bank Bldg. 307 N. Michigan Pittsburgh, Pennsylvania Chicago, Illinois Pittsburg, Kansas Wellston, Chie



to increase your grinding capacity

For the cement manufacturer with excess kiln capacity . . . here is the answer to INCREASED CAPACITIES at an appreciable SAVING IN HORSEPOWER. The Bradley Hercules Mill, used as a preliminary pulverizer before compartment mills or tube mills, results in INCREASED PRODUCTION of finished material at a LOWER COST per barrel.

Rugged, dustless construction, maximum accessibility keep maintenance costs at an absolute minimum.

Automatic electrical feed control eliminates manual operation.

For complete information, write for Catalog No. 57 -



PULVERIZER CO.

ALLENTOWN, PENNA.

BOSTON

HETHERINGTON & BERNER



performance-proven on the toughest jobs



Hetherington & Berner sand and gravel pumps are available in two general types: STANDARD, (4", 6" and 8" sizes) with semi-steel parts, for ordinary working conditions and moderate heads; and DREAD-NAUGHT, (6", 8", 10", 12" and 15" sizes) with manganese steel parts, for heavy duty jobs with stringent head conditions.

Write for Bulletin DP-147.

HETHERINGTON & BERNER INC.

755 Kentucky Ave.

Indianapolis 7, India

AERATING UNIT BIN-FLO



Provides Steady Flow of Dry, **Finely Ground** Materials which tend to bridge in storage. Uses only small umounf low-pressure nir.

BIN-DICATOR BIN LEVEL INDICATOR

For All Bulk Materials

signals change in level; automatically starts and stops filling and emptying equipment.



BIN-DICATOR CO.

13946-F Kercheval @ Detroit 15, Mich.

NEW DETAIL DATA BOOK PREE



Two "600" portables at work on a mountain road job.



Three "600" compressors used on the New York Thruway.



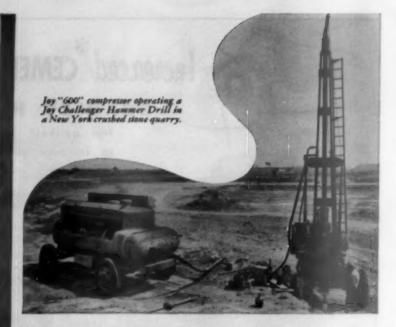
A "123" operating on roof of a Dallas skyscraper.



This "315" powers paving breakers on a Pittsburgh construction job.



A "600" with Joy Wagon Drills on a Philadelphia heating project.



JOY PORTABLE COMPRESSORS

...efficient, dependable in all kinds of service

You'll find Joy Portable Compressors on a variety of jobs, in all parts of the world. Check the owners...you'll get reports of consistently fine performance and complete dependability from the tried and true design.

Joy's background of 45 years in the portable compressor field has paid off in the development of these many fine features found in all Joy portables:

FOR PERFORMANCE Low-lift, large port-area, "direct-concentric" valves. Efficient air cooling, cross-flow intercoolers, matched engines, full force-feed lubrication to every bearing and working surface.

FOR DEPENDABILITY Oversize receivers, main bearings and starting equipment. Three-point engine-compressor suspension, rifle-drilled connecting rods and lightweight pistons. Welded steel frames and "bulkhead" body construction.

Five sizes are available—from 75 to 600 cfm. For details on how you, too, can benefit from Joy's field-proved design, write for free bulletin #A-55, to Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario





CONSTRUCTION EQUIPMENT MANUFACTURERS
FOR OVER HALF A CENTURY

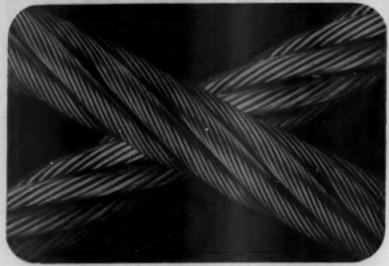
CONCRETE PRODUCTS

CONCRETE UNITS READY-MIXED CONCRETE



Room displaying concrete block units made by Spickelmier Co., Indianapolis, Ind.

FIRST WE DEVELOPED 1105 ROPE WIRE.



THEN WE MADE ROEBLING'S



1105 takes Royal Blue out of the ordinary wire rope class.

1105 is a rope wire that's new-that's stronger. It's the biggest news in many years.

1105 is the result of more than a century of research and development—it's the wire that gives Roebling Royal Blue the stamina that pays off in service.

Contact your Roebling distributor or write us for the full story.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation



JOHN A. ROESLING'S SONS CORPORATION, TRENTON 2, M. J. GRANCHES: ATLANTA, 034 AVON AVE. . GOSTON, SI SLEEPER ST. . CHICAGO, CS26 W. RUDGEVELT RD. . SINCHINNATI, SSSS PRECIONIA AVE. . CLEVELAND, ISSSS LAKEWOOD MEIGHTS BLVD. . DENVER, 4801 JACKSON ST. . OCTROIT, SIGPIEMES BLDD. . NOUGETON, 6316 NAVIGATION BLVD. . LOS ANGELES, 5340 E. MARGOD ST. . NEW YORK, 19 RECTOR ST. . GOESSA, TRIAG. 1920 E. 3ND ST. . PHILADELPHIA, CSC VINE ST. . SAN FRANCISCO, 1948 1971 ST. . SEATTLE, 980 IST AVE. S. . TULBA, 381 N. CHEYENNE ST. . EXPORT BALES OFFICE, 10 RECTOR ST., NEW YORK 6, N. Y.

INDUSTRY NEWS

Cover Picture

ON THIS MONTH'S CONCRETE PRODUCTS COVER is an illustration of the Spickelmier Co. exhibit at the Indianapolis Home Show. It was a room from House Beautiful Magazine to show the design and beauty possibilities, using Superwall concrete masonry units. The room was designated in the magazine as a "Man's Den." The diamonds, triangles and V linea of the concrete block walls were repeated in the floor plan, furnishings, bar, and terrazzo tables.

Precast Lightweight Concrete Bridge Shipped to Alaska

EMPIRE BUILDING MATERIAL Co., Portland, Ore., has recently completed prefabricating a 280-ft. pre-stressed expanded shale concrete bridge at its Portland plant, and is now shipping the members to Schooners Bend, Alaska (near Seward). The bridge will be erected to span the Kenai River by the C. M. R. Contractors, Inc., Seattle, (under contract to the Northwest District Office of the Federal Bureau of Public Roads).

Plans for the bridge called for precasting and prestressing sand and gravel concrete girders at the job site. This plan was dropped because the method would have entailed building a costly casting bed and using inexperienced workmen. Prohibitive shipping weight eliminated the possibility of prefabricating the members in the United States using sand and gravel. Use of expanded shale (Lite-Rock), however, overcame the weight disadvantage, reducing the concrete weight by one-third that of sand and gravel concrete. (Lite-Rock concrete in the bridge members weighs 100 lb. per cu. ft.).

The Kenai River Bridge will be twolane and built with sixteen precast 70-ft. girders, sixty 6-in. deck slabs, and concrete curbing made by Empire. The beams, prestressed by the



A 70-ft. prestressed expanded shale concrete girder leaving the Empire Building Material Co. plant in Portland, Ore., for bridge site in Alaska; delivery was via truck and coast-wise boot



Left to right: Frank Spangler, president, Empire Building Material Co.; and Ray B. McMinn and David Goodall, District and Highway bridge engineers, respectively, Federal Bureau of Roads (Dist. 8)

Freyssinet method, tested 5600 p.s.i., well above the specification minimum of 4500 p.s.i. Total prestressing force per beam is 600,000 lb. The bridge is completely precast except for the substructure and topping over the deck slabs.

Plans \$1,000,000 Expansion

BUILDERS SUPPLY Co., Houston, Texas, is planning a \$1,000,000 expansion program, which will double its production and storage capacity in Houston. The building of a \$300,000 ready-mixed concrete plant, two new warehouses, and new office buildings are included in the program. When completed, the company will have two large-sized combined ready mix building supply operations in Houston. About 60 employes will be added to the staff when the expansion program is completed, bringing the company payroll to about 210 persons. The company was formed in 1937 by Roy B. Drennan and J. S. Golson.

Pipe Plant

CHOCTAW INC., Memphis, Tenn., is building a \$500,000 concrete products plant on a 15-acre West Memphis, Ark., site. The new operation will first specialize in the manufacture of sewer and culvert pipe. Later, two relatively new products will be made, including concrete pipe in 6-ft. lengths and precast prestressed concrete bridge members.

Gravel Firm Adds Ready Mix

Berkshire Gravel Co., Pittsfield, Mass., has completed construction of a \$100,000 concrete batching plant at its Lenox Dale, Mass., sand and gravel operation. The plant has a daily capacity of 900 cu. yd. and employs six men.

MERCER STONE & MANTEL Co., Clairton, Penn., has begun manufacturing an attractive precast sandstone masonry unit named Clairstone. It is made with a variegated colored crushed sandstone aggregate obtained from the company's own quarry near Clairton. Fabricated in various sizes in hand forms, the multicolored stone is used for building homes, fireplaces, walls, walks, patios, etc.

SNYDER'S CONCRETE PRODUCTS, INC., Dayton, Ohio, has been granted a franchise for the manufacture of Marblox, by Marble Face Blocks, Inc., Kenilworth, N. J.

SPAHN AND ROSE LUMBER Co. has purchased the Tama and Toledo Ready Mix Concrete Co. from George Smith. D. E. Kellogg of Tama, Iowa, is manager of the firm.

DARWIN OLIPHANT, Toddville, Iowa, has started operations at a recently built ready-mixed concrete plant but is continuing ditching and excavating work in conjunction with the plant.

THE CHESTER CONCRETE PRODUCTS Co., Chester, S. C., has been purchased by R. D. Wilson of Chester. Mr. Wilson had been general superintendent of the plant which manufactures concrete block and other concrete products.

THE MARION READY-MIXED CON-CRETE Co., INC. has installed concrete block equipment at its Marion, Ind., plant, more than doubling its capacity to 7000 units daily.

MOELLER & WALTER of Reinbeck, Iowa, is building a ready-mixed concrete plant at Grundy Center, Iowa, costing approximately \$40,000. The firm has a 10-yr. lease on the proposed plant site near the Rock Island railroad tracks.

PALMETTO QUARRIES Co., Columbia, S. C., has purchased the concrete block division of the Dobbs Co., Columbia. R. V. Hudson will operate the plant in Myrtle Beach, and W. A. Foster will handle the sales.

ROCKET READY-MIX CONCRETE Co., Grand Junction, Colo., began operating a \$100,000 ready-mixed concrete plant in May. Owners are A. S. Mittry and K. S. Mittry, both of Fort Collins. Chales C. Weidlein is engineer.

PINNEY DOCK TRANSPORT Co., Ashtabula, Ohio, plans to erect a large ready-mixed concrete plant in Ashtabula, which will service a \$31.5 million titanium plant under construction there.

GEORGE SCHRYER, Cheboygan, Mich., has set up a new ready-mixed concrete paint on the property of the Cheboygan Lumber Co., in Cheboygan.

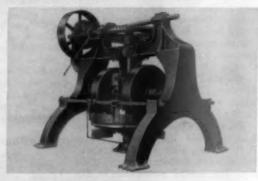
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Huber-Warco Grinders range in capacity from 4 to 75 yards per hour. Whatever your capacity requirement, there's a Huber-Warco Grinder exactly suited to your type of aggregate. Ask for a non-obligating consultation with the Huber-Warco grinding specialist . . . write, wire or phone.



HUBER-WARCO NO. 9 GRINDER

This 30 yard per hour capacity grinder has been designed to give big-volume aggregate production with a minimum of grinding costs. The suspended yoke mounted mullers are adjustable to any height, and for finer grinding, the grinding surfaces run together.



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You will be interested in several outstanding features of these mixers such as an exclusive,

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LEADING CONCRETE PIPE MAKER TRIED A HELTZEL PLANT, THE RESULT: THEIR NEXT RE-ORDER - ANOTHER HELTZEL

A couple of years ago a leading concrete pipe manufacturer purchased its first Heltzel plant for its southern operation in Florida. The manufacturer wanted a fast, accurate plant with large capacity that could be quickly converted to a transit mix plant to give greater flexibility of operation.

The Heltzel-designed plant lived up to specifications

so well that, when executives of this concern decided upon additional batching equipment for their Ohio operation, they simply asked for a duplicate of the successful Florida setup. The new plant, above, is truly the result of results . . . If you want batching equipment that will stand up to specifications—follow the leaders to Heltzel Batchmasters.

THE HELTZEL STEEL FORM AND IRON COMPANY

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BESSER Service is World-Wide!



Two of the five Besser Vibrapecs used on the Moracco Air Bases. These machines produced black to fast that two of them were shipped to other Mediterranean bases.

Besser Skip Hoist with Independent motor drive for hoisting mixed concrete to hopper of Vibrapac block machine.





Two of the lift trucks used on Morocca bases. Block cubing helped to expedite delivery of block to destination.

Vibrapac Block meet a world-wide demand for a versatile, durable and yet economical building material. Besser Vibrapacs are now operating in the following territories and countries: Africa — Alaska — Argentina — Australia — Canada — Czechoslovakia — Dominican Republic — England — France — Hawaiian Islands — Iceland — India — Ireland — Mexico — New Zealand — Palestine — Pagama — Philippine Islands — Puerto Rico — Russia — United States — Venezuela — Yugoslavia.

Write for literature describing Vibrapac machines, and ask for the name of the Besser restlent representative in your country.

VIBRAPACS help build Air Bases in French Morocco

The building of five air bases in French Morocco was a big construction achievement. Not only was each base a fair-sized, fully-equipped city, but the entire project had to be completed in record breaking time.

Concrete block, made on Besser Vibrapac machines, was a major building material used on these bases. More than 7,000,000 standard 8" units were used in constructing barracks, mess halls, recreation buildings, warehouses and shops. Vibrapac Block were selected because of their firesafety, insulation against tropical beat, bealthfulness, structural flexibility, lifelong durability and economy.

BESSER COMPANY, Box 135, Alpena, Mich., U. S. A.
Complete Equipment for Concrete Block Plants



Looking down from on top skip holst to Besser Mixer installed below floor level.

Illustration at right shows one of the Vibrapecs being unloaded from hold of ship.





World's Leading Manufacturer of Concrete Block Machinery

Equip Your Machine

to meet the demand for QUALITY BLOCK

automatically

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BERGEN ZerOmatic

HEIGHT AND DENSITY CONTROL

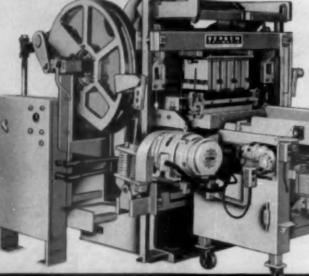
There's no doubt that competition in the block business, as in many other lines, is making the consumer "quality conscious." If you bid on a job, especially exposed masonry units, can you guarantee your customer that the block you supply will be of precise uniform height, density and texture? The Bergen ZEROMATIC will enable you to stand behind your product as it is doing for block plants through-

out the industry.

The ZEROMATIC permits your operator to pre-select height, density and texture which the unit will then maintain automatically regardless of existing variables in mixing time, moisture and aggregate. Don't overlook the ability of the ZEROMATIC to pay for itself in a

short time by increasing your yield in cement ratio per batch. The Bergen ZEROMATIC can be installed on your machine without any major alterations. Our service man will supervise the installation at your convenience so as not to interfere with production.

We will rush you full details by return mail if you write to Dept. R.



In every region of the U.S.
and Canada where one or more TriMatics are installed, they are still in
the hands of their original owners, a
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HIGH-PRODUCTION BLOCK MACHINE

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NUTLEY NEW JERSEY

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 Medusa Moisture Barriers made with Medusa Waterproofings are water repellent, puncture-proof, tear-proof and non-porous. You simply can't break, rip, or tear them like you can moisture barriers of plastic films, building coatings and the like.

Medusa Waterproofed Cements are integral. Unlike a coating, or a sheet, or a film, they permeate through every square inch of the concrete mass . . . every single pore, making the concrete structure an impregnable fortress against water.

When you can have integral moisture barriers at the same cost as other methods, why take chances with films and coatings. Furthermore, you know Medusa Waterproofed Cements are successful because they have a proved 48-year record of stopping moisture. They are the finest protection possible for footings, foundations, basement floors, utility room and garage floors.

You can make your integral moisture barriers by either using Medusa Waterproofed Gray Portland Cement or Medusa Waterproofed White Portland Cement, or by mixing Medusa Waterproofing Paste or Powder with any regular portland cement.



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PORTLAND CEMENTS FOR OVER SIXTY YEARS AMERICA'S FINEST

"We tested three mixers...



then bought Worthington

Now there's a thumping endorsement of Worthington Hi-Up Truck Mixers. It comes straight from the J. B. McCrady Company of Verona, Pa.

McCrady put a Worthington Hi-Up and two other mixers right to work on the job. McCrady watched their performance, checked the quality of distributor service, too. Let President John B. McCrady tell you the outcome himself:

"We do not believe there is a better mixer manufactured. Excellent service along with splendid field help by Worthington was responsible for our purchase of 3 more Worthington Hi-Up Mixers."

What convinced McCrady? Features that helped deliver better concrete faster—engineered weight

distribution for maximum legal payload . . . speedy discharge, even with low-slump concrete . . . and a really rugged transmission. Speaking of the transmission, it's specifically designed for a truck mixer. Single-lever operation, too.

Call your distributor now

Make arrangements today to see Worthington MIXERAMA—either working from your batching plant or from a Ready-Mix plant in your area. You'll be glad you did—almost as glad as you'll be when you can call one of these hard-working truck mixers your own. Worthington Corporation, Concrete Machinery Division, Section R.5.2, Plainfield, N.J.

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If It's a Concrete Job, It's a Job

Rock Drills . Wagon Drills . Pavers . Concrete Mixers . Portable Pumps . Portable Compressors



products which can only be made on Columbia's 12"-High machines. Columbia gives you all these specialty items at high production rates for maximum profits!



Here's the famous Columbia 12"-High... a machine that can be teamed with any other concrete block equipment because of the small floor space required ... a machine that, with a simple mold change, can produce either 12"-High specialty items or all standard 8" and 4" blocks. Electronically controlled, automatically operated.

NOW...GET AUTOMATIC PRODUCTION OF SILO STAVES, DRAIN TILE!

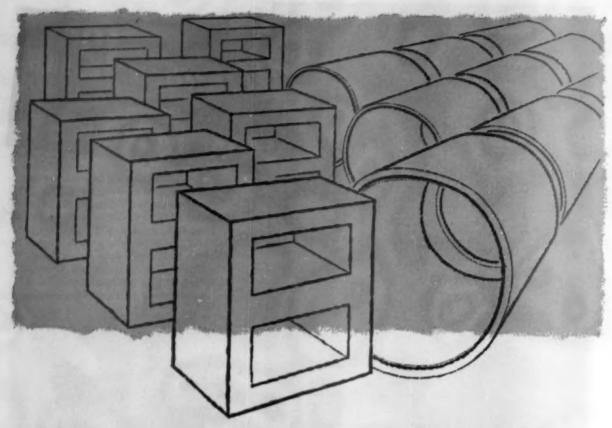
Take a look at the beautiful tall silo above . . . built with Columbia's 12"-High concrete staves, securely locked with one steel band per course. Other special shapes which can be produced on the Columbia 12"-High machine include drain tile, water meter boxes, flue liners, Roman tile. We'll design molds for 12"-High modeled face block for any special building purpose!

THE 12"-HIGH MAKES ALL THREE! In addition to special 12"-high shapes this great Columbia machine also makes all other standard block in 8" and 4" heights.

Write teday for catalog describing Columbia's one, two or three-black machines, combination rile-and-black machines, black splitters, etc.

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Let us show you how D-40 has helped other concrete products manufacturers make superior products, with a reduction in rejects, and at the same time increase production.

Economical D-40 plasticizes the "mix" to flow easier and more quickly into molds—filling out the corners and resulting in more perfect products. An added advantage is the reduction of abrasive wear on mixing and molding equipment.

Dry, granular detergent D-40 is easily added to the "mix" at the ratio of one to two oz. per bag of cement. Our experience is at your disposal. Contact any Oronite office for free sample of D-40 or ask for an Oronite detergent specialist to contact you.



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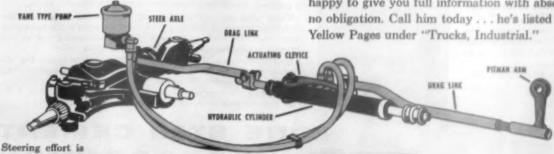
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Here's money-saving news: Hydraulic Steering is now available as standard equipment on Clark's 6,000-lb. Yardlift 60. Effortless Hydraulic Steering at no extra cost. Less driver fatigue, outstanding maneuverability in tight areas, and more positive control—means more work from your equipment.

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transferred directly from steering column to the hydraulic cylinder through drag link and actuating clevice assembly. Simple and positive design of Clark's Hydraulic Steering means fewer working parts, less maintenance—equipment that stays on the job longer.

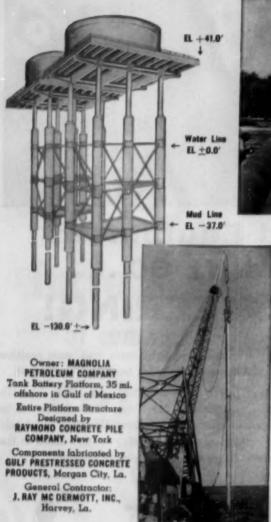
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Industrial Truck Division CLARK EQUIPMENT COMPANY Battle Creek 60, Michigan

A BETTER BUY WITH LOCAL SUPPLY-Genuine Clark Parts

Pioneering IN PILING PROGRESS

192-FT.-LONG PRECAST, PRESTRESSED CYLINDER PILE AND PRESTRESSED JACKET
ASSEMBLY HIGHLIGHT TANK PLATFORM CONSTRUCTION IN GULF OF MEXICO





Few construction principles have presented a broader opportunity for engineers and constructors than has prestressed concrete. Example of pioneering in this field is Raymond Concrete Pile Company's prestressed hollow cylinder pile, used in lengths up to 192 ft., in a tank battery platform for Magnolia Petroleum Company, 35 miles offshore in the Gulf of Mexico.

Photo, at left, shows 36-in.-diameter cylinder pile, 192 ft. long, standing unsupported 172 ft. above mud, in which it had penetrated 20 ft. under its own weight.

Equally interesting is the precast, prestressed concrete assembly which serves as bracing jacket. The jacket structure, shown above, consists of 54-in. prestressed hollow cylinder piles, braced with concrete-coated pipe. Assembled on barges, the jacket assemblies, each weighing 230 tons, were floated to location, where lift was made and the barge moved out from under.

The prestressed 36-in. cylinder piles were also barged to the site, lifted by crane, lowered through the jacket piles, and driven to required resistance. Finally, prestressed deck slabs were placed in position, ready for installation of two 5,000-barrel tanks.

These piles are reinforced in the conventional manner, then centrifugally cast by spinning. Cylinders are spun in 16-ft. lengths, fitted together, and prestressed by post-tensioning cables run through horizontal openings left in the cylinder walls.

Special methods of joining the cylinders, post-tensioning the steel, and grouting the wire cables produce a homogeneous product of unusual strength and durability.

As is so often true in milestones of construction progress, Lone Star Cement was used, because quality attracts quality.



LONE STAR CEMENT

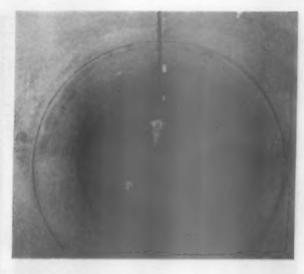
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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 18 MODERN MILLS, 141,600,000 SACKS ANNUAL CAPACITY

Batching Plant Cuts Block and Pipe Production Costs

Dixie Concrete Pipe Co., Nashville, Tenn., saves over \$23,000 annually with new batching equipment

By HUBERT C. PERSONS



A BATCHING PLANT designed to fit the specific needs of the Dixie Concrete Pipe Co., Nashville, Tenn., saves the company more than \$23,000 a year in addition to a substantial amount through operation with two instead of five men. Before the new batching plant was installed only cement in sacks could be handled, and the operation required five men. With the new set up, bulk cement is used at a cost of 45¢ per bbl. less than cement in sacks. Since the plant uses an average of 1000 bbl. of cement a week, the weekly saving is \$450 and the annual saving more than \$23,000.

This plant manufactures reinforced concrete pipe in a wide range of sizes for sewer lines, drainage systems and highway projects. Unreinforced con-

crete drain pipe is also made in small diameters. In addition to pipe, about 20 percent of the plant's production is heavy concrete masonry units made from sand and limestone aggregate. This block is used principally for foundations.

Pipe Plant Equipment

E. C. Rodgers, engineer and manager of company, inspecting 84-in, sewer line

Equipment includes one Universal tamper machine, making reinforced concrete pipe in sizes from 10 in. to 66 in. in 4 ft. lengths, and one Universal packerhead machine to produce reinforced concrete sewer pipe in sizes from 4-in. through 18-in. diameters in 3 ft. lengths.

Reinforced concrete pipe in 8 ft. lengths and from 24-in. to 120-in. diameters are made in a casting yard.

Equipment in the casting yard includes one Model SC-180 Hyster fork lift truck of 18,000-lb. capacity; one Model 40, ¼-cu, yd. Lorain crane; one Model 19, HT Ross lift truck, 6000-lb. capacity; and four Maginnis internal vibrators operated by a Hilectric generator.

Operate Five Curing Rooms

Three of the plant's five curing rooms are used for pipe and two for block. The curing cycle begins at 6 p.m. Steam temperature builds up to 125 deg. F. by midnight when the steam is turned off and the block allowed to cool gradually overnight. Steam at atmospheric pressure is supplied by a gas-fired horizontal boiler.

Large diameter pipe, made in the



Overall view of batching and pipe plant in the background with stockpile of 72 and 84-in, pipe in the foreground

Filling form for 60-in, reinferced concrete pipe in the large casting yard outside plant





Left: Traveling batch box returning to batching plant for another load



Right: Traveling batch box being charged at two-way hopper under the batching plant. Spout to the right charges mixer

casting yard, are steam cured with a three-car Cleaver-Brooks asphalt heater. The pipe are covered with canvas hoods and steamed at 140 deg. F. from 6 p.m. to 2 a.m.

Bulk cement is delivered to the plant in railway cars, and is unloaded by a 48-ft. under-track screw conveyor which moves it to an Erie cement elevator from which it is distributed by chutes to storage bins in the 68-ft. high batching tower. This elevator has a capacity of 266 bbl. per hr.

The batching tower contains an Erie "CS" combination aggregate and coment bin with total capacity of 160

cu. yd. This is divided into six compartments, one holding 310 bbl. of cement and the others holding aggregates. An Erie CSB cement silo at ground level holds 592 bbl. of cement.

Aggregates are delivered by truck. The plant uses coarse aggregate in sizes from 11/4-in. down and sand from 14-in. to 100 mesh.

Automatic Batching Equipment

Cement is weighed in an Eric Model DWH 15-cu. ft. cement batcher. This is equipped with a rotary vane feeder with an automatic electric eye cut-off and beam scales. Aggregates are

weighed in an Erie Model BWC 2-cu. yd. batcher with beam scales.

Operations in the batching tower are handled by one man. Both cement and aggregate are discharged into a Y-shaped two-way hopper. A dry batch can be discharged from the chute either into a Model CMC 28-S stationary concrete mixer which supplies concrete for the casting yard or into a two-compartment traveling batch box which supplies dry batches for the two pipe machine mixers and the 50-cu. ft. Universal mixer serving the Besser Vibrapac block machine. Water is added to the casting yard mixes



Tamping machine for the manufacture of 12-in, reinforced con- Using fork lift truck to pour concrete into steel form from tremie crete culvert pipe



concrete bucket

by the batch plant operator using a 11/2-in. Neptune water meter. The batch plant operator also runs the mixer for the casting yard. Water for the block and pipe machines is added by the mixer operator who tends all

three Universal mixers.

The traveling batch box powered by a 3-hp. electric motor moves on an overhead rail system or craneway. The craneway is centered over the mixers so that the batch box can be discharged directly into any mixer.

The batch plant operator fills the traveling batch box, presses a button to designate the mixer to be charged

R.R. TRACK UNDER TRACK 592 BL TRUCK HOPPER SEMENTA AGGREGATE ELEVATOR 300 AGG AGG 2 CU.YD. BATCHER 2 WAY CHUTE MIXER FOR CASTING YARD

Flowshest of cement and aggregate materials from railroad under-track hopper to pipe and block machines

and starts the batch box on its way. The box is stopped in exactly the proper position by a limit switch attached to the rails of the craneway. When the batch is discharged, the mixer operator signals the batch plant operator by a system of colored lights, indicating that the batch box can be moved to another mixer, or returned to the batch plant for another charge.

The design of the batching plant also permits dry batching ready-mixed concrete trucks from two-way chute.

According to E. C. Rodgers, manager and engineer, the pipe plant produces about 200 tons per day on a 10-hr. shift. Daily production in the casting yard is: 80-ft. of 72-in. pipe, 80-ft. of 60-in. and 40 ft. of 50-in. Annual production of the block plant is approximately one million 8- x 8x 16-in. equivalent units.

Early in 1955 the plant was supplying reinforced concrete pipe in the large diameters for a six mile interceptor sewer for the city of Nashville.

Key personnel of the Dixie Concrete Pipe plant, in addition to Mr. Rodgers are: Herman Lawrence, plant superintendent; Wayne Harper, office manager; and George Gant, Jr., sales representative.

Accelerated Drying of Block

NATIONAL CONCRETE MASONRY ASsociation has recently published a technical report entitled "Accelerated Drying of Concrete Masonry Units" by Edward Mangotich. The report covers tests at the V. Paturzo, Bro. and Son, Inc., Baltimore, Md., block plant, where a specially-designed dryer is being used to dry block in 7 hr. to a moisture content below 30 percent of total absorption. The effect of this elevated temperature drying (at temperatures above 240 deg. F.) on compressive strength and other physical properties is described.

Washington Producers Meeting In British Columbia

THE CONCRETE PRODUCTS ASSOCIA-TION of Washington held its 26th annual summer convention at the Harrison Spa, Harrison Hot Springs, British Columbia, Canada on June 10, 11 and 12. The hotel is located in a very scenic part of the Canadian Rockies with widely diversified recreational

The Concrete Products Association of Washington membership is composed of both concrete pipe and concrete block manufacturers, and its importance was emphasized by the fact that every western Washington manufacturer of portland cement had representatives in attendance as well as many machinery manufacturer representatives. W. S. Callender is manager of the association with Bob Merryman as assistant manager. The following officers and directors were elected: Verne Frese, president; J. W. Sullivan, vice-president; J. B. Lundberg, secretary; and directors, Harold W. Stevens, C. H. Norton, G. P.

Duecy, W. S. Wilson, past president.

National figures in attendance were: S. Carl Smithwick, president of the National Concrete Masonry Association; A. W. G. Clark, president, American Concrete Pipe Association; and John A. Ruhling, Washington, D. C. representative. American Concrete Pipe Association.

At the business session, Mr. Ruhling gave an outline of the activities of the Washington office of A.C.P.A. E. Ellis Cummins was chairman of the business session, and at the banquet. George P. Duecv was master of ceremonies. G. M. Morris, assistant general manager, Vancouver, B. C., Board of Trade, the banquet speaker, gave some of his experiences while on a trip to Japan for the Vancouver

Board of Trade.

The principal speaker at the business session was S. Carl Smithwick. He outlined some of the recent atomic blast tests at Yucca Flats, near Las Vegas, Nevada, in which reinforced concrete block structures gave excellent results in withstanding the effect of the blast. He pointed out, however, that the block structures were reinforced according to the California Code. This calls for 1/2-in. steel reinforcing on 32-in. centers for the vertical rods and 24-in, for the horizontal. It amounts to 0.72 lb. of steel per sq. ft. of wall surface, the speaker pointed out. Details of these tests appeared in ROCK PRODUCTS, July, 1955, page 142. He said five concrete products manufacturers spent about \$50,-000 on the project. The speaker cautioned about over-optimism in advertising relating to the bomb test results at Las Vegas until all facts are available.

Another important part of the program was the presentation of the association's new pamphlet on sewer pipe. This bulletin is designed to help the membership in sales talks to state, county and city engineers, contractors, architects and all builders who might be interested in the use of concrete pipe in sewer work.



Left to right: Verne Frese, newly elected president of Concrete Products Association of Washington; A. W. G. Clark, president, American Concrete Pipe Association; and S. Carl Smithwick, president, National Concrete Masonry Association

NEW MACHINERY



Sand Moisture Meter

NATIONAL CONVEYOR & SUPPLY Co., 346-356 N. Harding Ave., Chicago 24, Ill., has announced a moisture meter, giving the percentage of surface moisture content of sand from 0 to 12 percent. A single brass rod electrode is mounted in the batching hopper and connected to the meter by an electric cord. The meter can be mounted in any convenient location. It is designed to enable the operator to produce mixes of high quality in a minimum of time.



Concrete Block Receiver

STEARNS MANUFACTURING Co., INc.. Adrain, Mich., has announced a motor driven, double pallet, concrete block receiver for Model 15 and Model 50 series block machines. The block receiver has a ½-hp. gearhead motor drive and electrical controls, which automatically delivers the first pallet of green block from the machine to the front of the block receiver. It has sprocket and chain type conveyor

rails, which are said to withstand oil from the pallets. The complete unit can be lifted from the block machine, for mold box changes and machine cleaning.

Air Entraining Agent

PRECO CHEMICAL CORP., Garden City Park, N. Y., has announced "Entrex," an air entraining agent which is said to provide concrete with improved durability; resistance to the disintegrating effect of freezing, thawing and de-icing salts; increased workability; elimination of bleeding, segregation and honey-combing; finer surface texture; and greater plasticity. It is also said to provide concrete products with less breakage, higher compressive strength and lower water absorption. The product meets government and A.S.T.M. specifications.



Single Mast Lift Truck

Hyster Co., P. O. Box 4318, Portland 8, Ore., has introduced the "Monomast" lift truck, featuring a single mast consisting of two box-type sections, one telescoping within the other. The design provides the driver with an unobstructed view of the forks and load. Total weight of the upright is about the same as standard type assemblies, but torsional rigidity in the mast is said to have been increased 80 percent, and mast deflection reduced 50 percent over conventional assemblies. Load raising speed is 58 f.p.m., and slight horizontal carriage flotation permits the lift truck to angle block out of tight positions after un-

A piston-type cylinder with a selfadjusting packing gland is designed to minimize oil leakage and provide longer packing life. The standard hydraulic attachments can be mounted on an attachment carriage; non-hydraulic attachments are also available. The Monomast mounting may be installed on current 3000 and 4000-lb. Hyster models UC-30 and YC-40 without alteration. Either unit can be equipped with Hystamatic automatic drive and may operate on either LP gas or diesel fuel. Optional standard lift heights up to 12 ft. are available.



Step-Tread Mold

R. L. SPILLMAN Co., Box 534, Station G, Columbus, Ohio, has brought out molds for "do-it-yourself" type concrete step-tread units. The units are 36 x 48 in. with beveled edges and corners, and fit all combinations of 8-in. concrete block. One of the advantages is that the manufacturer does not install the units, as the treads are just laid on concrete block. No finish work is required, and there is no skill required.



Masonry Saw

ROBERT G. EVANS Co., 7204 Wyandotte, Kansas City 14, Mo., has announced the Target "Thrifty" masonry saw with a 1½-hp. totally enclosed motor. The cutting head, saw frame and conveyor cart are of the same size as on the "Roll-O-Matic," with only the head height adjusting mechanism omitted. An angle-set mechanism permits the operator to angle the cutting head from any size material and for any kind of cut. The cutting head is removable for portability.



Above: Plan room on the main floor. Note glass black and split black wall built around fish tank

Right: Striking interior view showing diagonal walls and diverse interior treatment. Standard block, split block, F & A floor and roof system, and cast-in-place stairway are shown

 Economy Block Co., Wauwatosa, Wis., invites architects, contractors and builders to see modern structure



New Office Shows Concrete Masonry Versatility

ARCHITECTURAL VERSATILITY in concrete masonry was the theme used by Economy Block Co. in designing its new office building in Wauwatosa, Wis. A curved facade, diagonal walls, and diverse interior treatment are used in this attractive building. Several hundred architects, contractors and builders attended the open house in June.

Three primary ideas governed the building design, according to William R. Menard, president: first, that concrete masonry can stand on its own merit as a finished material; second, that concrete masonry does not have to be confined to 90 deg. angles; and third, that concrete masonry is as architecturally flexible as any other building material. Built with standard lightweight masonry and F & A units, the two-story structure testifies to the successful achievement of all these goals.

In building the diagonal and curved walls, use was made of power hand saws equipped with carborundum blades; the precise trimming operation was done at the job-site. Curves for the facade were developed simply by sawing off the back ears of standard 12-in. units. This allowed a radius of 5 ft. for the circle, and the facade itself is a combination of 26-ft. and 5-ft. radius curves. All of the exterior walls,

including the curved section, were laid in stacked bond with control joints employed at selected intervals.

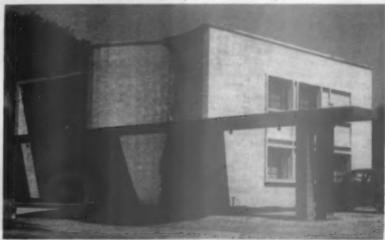
The entire interior partitioning was done with standard 6-in. lightweight units, and treatment of the walls again demonstrates the multiple patterns and textures possible with standard units. To achieve ornamentation, standard glass block were combined with the masonry units for interior walls of the

plan room. One interior wall of this room was built around a 3- x 4½-ft. fish tank, giving an exceptionally interesting effect.

Electrical, plumbing and heating contractors installed pipe prior to erection of the interior partitions without incurring additional expense or complication. After they had finished, the masonry partitions were built around

(Continued on page 258)

New office building of Economy Block Co., Wauwatosa, Wis., which demonstrates the architectural versatility of concrete masonry units





Bulk cement cars lined up to dump contents into track hopper

Control All Operations from Batching Tower

In the Ready-MIX concrete industray, deliveries on time and as specified are vitally important. Not making deliveries on time can cost a customer a considerable amount of money in labor time lost, serious delay in construction progress, and other costly inconvenience.

In line with this thinking, E. L. Dauphinais Co. strategically located its five plants to service quickly and efficiently the surrounding major trade areas. Beginning operations 18 years ago, Mr. Dauphinais, Sr., and his three sons, Armand, Emil and Al, who now actively manage the business, have built up a large volume of ready-mixed concrete sales, in addition to supplying considerable amounts of sand and gravel to local users.

According to Armand Dauphinais, ability to give quick and efficient service to customers stems from the strategic location of plants, use of the most modern equipment and machinery, plus close supervision by management of the total operation. Regardless of the weather, either winter or summer, as long as masons can work, the company will supply concrete.

A new modern plant has been located practically in the center of Worcester, Mass., having a population of about 300,000, the second largest in the state. The city has a tremendous construction potential and all this market can be served quickly and efficiently from this plant.

The proximity of a rail siding for

receiving cement shipments and a source of supply of aggregate is important. The company's North Grafton plant, only six miles from the Worcester plant, covers over 100 acres and is a relatively untapped source for sand and gravel. The Worcester plant is located on a railroad siding which can accommodate as many as ten cars carrying bulk cement. The cement is carried by screw conveyor and elevator into the hopper. Aggregate is dumped into underground bins below the garages, where a 300-ft. belt conveyor transports it to

• E. L. Dauphinais Co., operates five ready-mixed concrete plants; latest modern plant in Worcester, Mass. All plants located for economical hauling radius and convenience in receiving materials

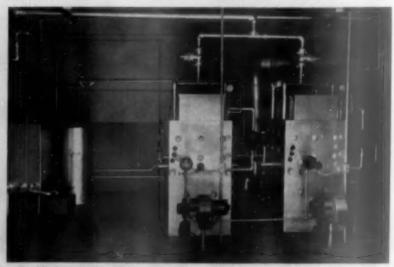
the batcher hopper. The plant handles over 200,000 cu. yd. of concrete annually from a plant which is only 54,000 sq. ft. in area.

A fleet of over 60 transit mixers are used. Despite the compactness of the plant, there is plenty of maneuverability for trucks in the yard. The plant is so laid out that from the batching tower, the operator can see and call anyone in the yard. This close supervision affords Armand Dauphinais the close and rigid control of the operation from his position in the batcher.

All mixers are kept scrupulously clean and relined when necessary in the Dauphinais shop by the welders. Some mixers have two-way telephones to keep them economically routed for various calls in different localities.

For all year-round operation, the company has installed in the Worcester plant, two 35-hp. Consolidated Duo boilers. This heating system, designed by L. E. Burkhart, utilizes fast steaming boilers for heating 3000 gal. of water in a pressure tank with coil, and for providing heat for the garages and batching buildings, plus steam to keep

(Continued on page 256)



Duel baller units heat 3000-gal, tank, the aggregates for concrete, and the garage

UNION Negotiations and Trends

By JAS. A. NICHOLSON*

34: A producer views the ready-mixed concrete business. The labor relations problem has become so acute that these observations on current conditions are particularly timely

AT THE RECENT SPRING MEETING of the directors of The Ohio Ready Mixed Concrete Association, Steve Stepanian, the beloved founder of our industry, made a unique observation when he stated that the two most important problems that Ohio producers face are: (1) the cement supply situation, and (2) labor relations.

There are a number of producers who agree that these two serious matters require the courageous attention of all ready-mixed concrete companies. Certainly, recent negotiations with Toledo Teamsters confirm Steve's opinion as to the importance of labor relations.

Labor negotiation is, by and large, a polite name for union trouble. As has been said many times, the union is an opposing force that all of us face, many of us fear, and some of us hate. At contract negotiation time, concrete producers face in their union adversaries, confident, determined men who know how to get their way and who generally are willing to go all out to get what they want. In many cases at negotiation time, your employes and mine are herded together in a rather crude form of police state until a strike vote becomes a mere formality. That "formality" strike vote is quite apt to become a legal shakedown tool.

Toledo Drivers Strike

The Toledo strike was taken before the parties began labor contract negotiations. Actually, most of the men didn't and don't know what the union ultimately proposed to the companies. The employes have never been told by the union what the companies offered. Today the entire building supply industry is shut down on a strike—building supply people, ready-mixed concrete producers, and block manufacturers—all shut down and most of the striking employes don't know what it's all about.

In Toledo we have been through a siege of collective bargaining that was

anything but collective. To start off, there was a completely new set of union demands. With very few exceptions, the new proposal contained no wordage found in prior years' contracts under which we had operated in comparative labor peace. The proposed agreement, if it can be so dignified, was largely patterned after the "over the road haulers" contract, which is now state-wide and is under process of being made into an area-wide agreement covering a number of Midwestern and Southern states.

In negotiations, we were facing and testing new leaders recently selected by the National organization. The Toledo Teamsters' local leader had just been kicked out. A militant convert from the C.I.O. had been given the union helm by Jim Hoffa of Detroit. The new union leader has not yet met with us. So far we have only been confronted by one of his assistants who apparently has authority only to say "no." At least, that's all he has ever said to us. The wage demands were based on increases recently granted by the Detroit Ready Mixed Concrete Industry. 1955 concessions made by Detroit producers included a 12¢ an hour pay increase; 25¢ a week added to the welfare plan; an employe put to work guaranteed 6 hr.; a new pension plan starting out with the employer paying 5¢ per hour; four weeks' vacation; and a troublesome leased equipment clause.

From the beginning of negotiations, the union refused to discuss anything except its set of demands. We had prepared our own proposed contract. The union refused to discuss a single clause of our proposal, nor would they consider retaining any of the clauses of the 1954 contract. We attempted to show favorable increases compared with other area workers; we pointed out that wage increases had kept ahead of cost of living increases; we offered wage concessions that would give Toledo ready mix drivers the highest hourly rates in Ohio. Neither facts nor figures interested the union. The men of the union were not even given the opportunity of turning down \$2.27 per hour. They were simply pulled out on strike.

From the beginning, we heard from

the union representatives such remarks as—"it's the men want this"—"we are going to get that clause"—"this demand is a must"—"this is what we're going to get"—and "it's either this or stand a strike." The Detroit regional officers had apparently told their local representatives what they had to get. During our regular negotiations, the union did not agree to make one single concession to their demands.

In addition to the increases and benefits granted by Detroit producers, the Toledo union demand included such items as establishment of daily shifts with a week's notice by the company and union approval received before any shift changes can be madean employe told to work before his regular shift starts gets time and a half-for any man put to work a guarantee of 8 hr. work for the daytriple pay penalty for any driver not getting a half-hour lunch period within 5 hr. of report time-one week's notice of lay-off or a week's pay in lieu of notice-seven day extra sick leave pay-five-day funeral leave with pay for death of a half-dozen relatives-jury duty pay-co-management and super-seniority status for stewards who were to be given free reign to throw their weight around the plants -and a host of other demands, some of them quite unreasonable. One such demand was on leased equipment.

Leased Equipment Demands

The leased equipment demand attempted to spell out these requirements:-all drivers working on leased trucks to be placed on the company's payroll and entitled to same wages; premium and holiday pay; vacations; and all other fringe benefits as our regular drivers, including call-in pay and 8-hr. guarantee per day if put to work. These requirements were to apply to both owner-operators and truckers operating on P.U.C.O. permits. We informed the union that we had an opinion from the Public Utilities Commission that any P.U.C.O. hauler who put his employes on our payroll would lose his hauling rights. In spite of this evidence, the union refused to alter its arrogant demand.

The leased equipment clause also

^{*}Pres., Nicholson Concrete Co. This article contains basically the same material presented in a talk at the resent annual meeting of Ohio Ready Mixed Concrete Association. The series of articles on "Preventive Maintenance" will be resumed in the September issue of ROCK PRODUCTS.

required the companies to pay the lessor on an hourly, daily, weekly, monthly, or tonnage basis, sufficient money to guarantee costs of operation. It may surprise many that Detroit concrete producers have agreed on a \$6.15 per hour cost of operation minimum for a five-yard mixer, exclusive of driver's wages and benefits, which total approximately \$3.00 per hour. Except in special cases, the \$9.15 per hour minimum on 5-cu. yd. units that Detroit producers have agreed to, probably means that leasing of trucking equipment has been contracted out of existence.

Management Rights

In our Toledo bargaining, we faced a situation that was clearly described in Vince Ahearn's excellent 1955 Miami talk titled "Check List for Employers in Writing Labor Agreements." Make sure you read that important paper! The key union representative took the position that it was his job to dictate terms and that the work of our negotiating committee was limited strictly to trying to soften up his determined, even though wildeyed, demands. There was a complete absence of any mutual respect or mutual understanding of each other's problems.

Throughout our Toledo negotiations we refused to be intimidated. We rejected every proposal that called for surrender of management authority and responsibility. We turned down pattern demands. We insisted upon contract clauses that fitted our industry and which were fair to both employes and the companies.

On the other hand, we got absolutely no place in attempting to spell out a management rights or responsibilities clause. The proposal demanded by the union contained no management prerogatives. The union refused any consideration of company rights and responsibilities. Whatever we suggested or demanded along this line was given a complete brush-off.

There is conflicting opinion over the value of a management's rights clause. It is true that no management rights are lost because such a clause is missing. It is also true that enumerating some management rights doesn't mean that rights not enumerated are lost. It is likewise probably true that any local effort to get a good management responsibilities statement will stir up some union hostility. The clause suggested in the new issue of "Standard Clauses for Labor Agreements" prepared by the National Ready Mixed Concrete Association is a good statement and should be in every producer's contract.

Our small companies need all the

protection they can get. When a good management's clause is clearly stated, key men know the extent of their authority and workers are less likely to question reasonable orders. Our men should understand that companies have full authority over the working force on such matters as hiring, directing, promoting, demoting, or transferring employes. The future of a company and the welfare of all working personnel are dependent on the efficiency of the operation. As long as management is living up to its labor contract obligations, a union has no right to interfere with efficient operations and capable direction of the work force.

In addition to management rights and responsibilities, the union also saw fit to eliminate discharge for just cause; a no-strike agreement; an arbitration clause; any rules and regulations; or any suggestion that a company is entitled to a decent day's work from its men. In our negotiations, the union representatives were not the least bit cooperative in discussing any of these points.

Previous to the calling of the strike, the union, under constant pressure, had agreed to eliminate deductions for credit unions—overtime for starting before regular report time—the fourth week vacation demand — monthly meetings between stewards and top management — payment of stewards by company for time spent in labor contract negotiations — a clause in which management shares responsibility for promotions with stewards—jury duty pay — sick leave compensation — five-day funeral leave with pay —and the pension plan.

During earlier negotiations directly with the union and in later meetings before a Federal Conciliator and a panel of Toledo's Labor Management Committee, the company representatives had agreed to bad union recognition and seniority clauses - offered to pay time and one-half for all Saturday work regardless whether or not an employe had missed work during the week of his own volition - consented to pay for all six holidays even if a holiday fell on a Saturday, which was not part of the regular work week offered wage increases of 121/2 ¢ per hr. — made a compromise three weeks' vacation offer - agreed to pay a steward 5¢ an hour extra and gave him super seniority - accepted the union demand that supervisors do no physical work-consented to a tough hot-cargo clause - increased welfare payments 25¢ per week - and promised an effort to improve lunchroom, toilet, and locker facilities.

When the strike came, the companies and the unions were at loggerheads on vacation demands — guaranteed 8-hr. day for men who are put to work — leased equipment provisions — one week's lay-off notice—penalty for late lunch hour period — and employe reclassification. In reclassification, any yard employe who handles motorized equipment is to be paid a higher rate even though such work is only part time.

Unreasonable Demands

Of course, since the strike has been called, the union has withdrawn each and every one if its concessions and is demanding the original three-year proposal in its entirety, including four weeks' vacation - a deferred and unexplained pension plan-a guaranteed 8-hr. day for those put to work-and an increase per hour in wages of 1814 ¢ (1955); 121/2 ¢ (1956); 10¢ (1957). It is my belief that effecting a settlement is going to be a long hard job. Nevertheless, we intend to make every effort to get a workable contract that we can live with. We will make every effort to avoid starting Ohio trends on four weeks' vacation; leased equipment; 8-hr. guaranteed day; or acceptance of a pension plan.

There are trends that you and I must face and consider. The 48-hr. week and the 54-hr. week have largely given way to the 40-hr. week; the 9-hr. day to an 8-hr. day. Call-in pay has been widely accepted. Call-in demanda are being raised from 2 to 4 hr. Paid holidays are coming rapidly into the picture. Extra weeks of vacations are being demanded. Payments for late lunch periods are being pressed. Welfare programs are becoming a "must."

Our industry is in an uncomfortable position. In our work, we are closely associated with building trades personnel who are drawing top hourly rates. Our men know these building trade rates. They are quite ready to go for wage equalization. In our labor relations we deal with the Teamsters, the nation's most militant union. If and when we get into labor difficulties we can count on very little support from contractor customers; in fact, our key customers will probably be pressuring us to accept the union's terms, regardless of cost. Most of us are beset by cement shortage problems. We are limited to small legal payloads. We are in a tough seasonal business. A long, hard winter is likely to wipe out the profits accumulated during good building months. One Ohio company reported to me a \$40,000 winter operations deficit. With a morning's rain, a full day's booking of orders may be canceled. Blacktop is becoming increasingly competitive. Precasting and prestressing are threats to our present

(Continued on page 264)



Never before has there been a ready-mixed concrete carrier like Oshkosh's FIFTY-FIFTY! Up to 5 cubic yard capacity means greater payloads — increased profits! Powerful 4-wheel drive traction lets you spot loads under adverse conditions . . . get jobs competition can't handle! Two driving axles means lower maintenance cost and its 144" wheelbase means greater maneuverability. Easy to service — just lift side panels for instant access to engine! Write for details and how you can have an on-the-job demonstration without obligation!

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Fully loaded Oshkosh 50-50 ready-mixed concrete carrier demonstrating short turning radius and excellent flotation while making 25 consecutive turns in soft beach sand at

Oshkosh 50-50 ready-mixed centrete cerrier with high level pouring speut eliminates double handling of contrete. Photo taken at New Penn Daw School, Alexandria, Va.

OSHKOSH

OSHKOSH MOTOR TRUCK, INC.

LABOR-LEGISLATION and SPECIFICATIONS

 Discussed at Ohio Ready Mixed Concrete Association annual meeting in Cincinnati, Ohio

MORE THAN 130 MEMBERS, associate members and guests attended the 17th annual meeting of the Ohio Ready Mixed Concrete Association, at the Sheraton-Gibson Hotel in Cincinnati on June 22 and 23. The first day was devoted to an afternoon meeting of the officers, directors, and members of the specifications, cement, labor, and promotion committees, followed on the second day by the general business meeting. Insportant papers were presented on legislative matters, Ohio's Lien Law, labor negotiations and trends, and state highway specifications. In addition, Vincent P. Ahearn, N.R.M.C.A. executive secretary, gave an interesting Washington report.

New Officers

Officers elected for the coming year were Charles O. Dittrich, Hilltop Building Materials, Inc., Cincinnati, president; George J. Frye, Dayton Builders Concrete Co., Dayton, vicepresident; Ralph H. Anderson, Anderson Concrete Corp., Columbus, treasurer; and Claude L. Clark, secretary. Newly-elected directors for three year terms were: Carl F. Shoaff, J. P. Loomis Concrete and Supply Co., Akron; L. L. Huth, Massillon Washed Gravel Co., Massillon; and Jack E. Riddell, Consumers Builders Supply Co., Lorain.

In his welcoming address, Carl F. Shoaff, outgoing president, reviewed the past year's activities, pointing out that the association added 13 active and five associate members, bringing the total membership to 124 active and 34 associate members. In view of the trend toward stiffer competition, tougher specifications, rising labor problems, and contractors operating their own ready-mix trucks, he urged all members to take an active interest in association matters. He maintained that the competition can be met by producing quality concrete and rendering top service. Mr. Shoaff also discussed a new leaflet recently prepared by the specifications committee, describing standard methods for making slump tests and concrete cylinders for testing, which is available for distribution to contractors and architects throughout the state.

Russell P. Mumford, Springfield, chairman of the short course school committee, reported that the fourth annual short course school, held at Ohio State University in February,

C. O. Dittrich, incoming president, left, receiving gift from Paul Lenchuk, executive-secretary of the newly-formed Florida Concrete and Products Association, Mr. Lenchuk and Geo. Coetz, Florida producer, were guests was highly successful, having had an enrollment of 207. About one half of the registrants were employes

of 62 active member companies. In announcing that the next school will be held at the University of Akron on January 16 to 18, 1956, Mr. Mumford urged that producers send as many employes as possible; only through knowledge can quality concrete be made, he said.

Legislation

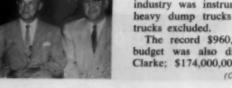
In discussing current state legislative matters, Claude L. Clarke, association secretary, reported that 1352 bills were introduced in the Ohio Legislature during the current session, some of which concern the ready mix industry. He mentioned several bills which would raise unemployment compensation and industrial insurance benefits if passed. One proposed bill had provisions for raising the maximum benefit duration from 26 weeks to 39 weeks, and the maximum weekly benefit from \$30 to \$50. Another bill proposed a maximum weekly benefit of \$33. A proposed Industrial Insurance bill would increase maximum weekly compensation benefits for injury or death and also increase total death benefits.

Mr. Clarke reported that a bill amending the axle-mile tax, making it more workable, was passed and would undoubtedly be signed by the governor. A bill requiring mud guard flaps on dump trucks and another bill requiring installation of safety bumpers on the rear of all commercial vehicles were postponed indefinitely; during discussion of the latter bill, the industry was instrumental in having heavy dump trucks and ready mix

The record \$960,000,000 biennial budget was also discussed by Mr. Clarke; \$174,000,000 is to be ear-(Continued on page 261)

Officers and directors of the Ohio Ready Mixed Concrete Association. Seated, left to right: Stephen Stepanian, Arrow Sand and Gravel Co., honorary director; Carl F. Shaaff, J. P. Loomis Concrete and Supply Co., retiring president; George J. Frye, Dayton Builders Concrete Co., vice-president; Charles O. Dittrich, Hilltop Building Materials, Inc., president; Ralph Anderson, Anderson Concrete Corp., treasurer; and Claude L. Clarke, association secretary. Standing, left to right: Harry M. Graff, Portsmouth Mixed Concrete Co.; Eugene E. Osborne, Clinton Construction Co.; Jack E. Riddell, Consumers Builders Supply Co., new director; J. A Nicholson, Nicholson Concrete Co.; L. A. Kempter, Goff-Kirby Co.; and R. H. Slugg, Hamilton Gravel Co. L. L. Huth, Massillon Washed Gravel Co., a new director, was absent when photo was taken





Air-entrained concrete costs less with ERTRANE°C

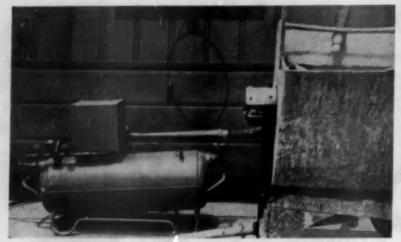


2. Ease of handling and storage. Ertrane C is packaged in a 60-lb, multiwall bag. No danger of freezing or caking.

a uniform solution in either hot or cold water, without adding caustics to pany, 606 Industrial St., Harrison, N. J.



PLANTS: Harrison, N. J. Cedartown, Ga. . Richmond, Calif.



Generator produces 10 cu. ft. of foam per minute

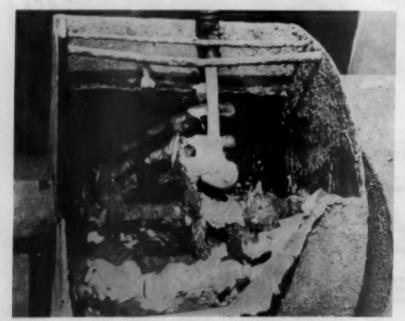
CELLULAR CONCRETE

 Aerated concrete, made by introducing a preformed, stabilized foam into a mixture of cement, sand and water, is marketed by Cellular Products Co., Los Angeles, Calif.

CLOSE CONTROL OF CONCRETE DEN-SITY through a range from 20 to 100-lb. per cu. ft. is said to be obtained with a new cellular concrete available on the Pacific Coast under the trade name Aerofill. According to Eugene R. Jolly, of the Cellular Products Co., Los Angeles, Calif., Aerofill is a cellular aerated concrete made by the mechanical introduction of air

cells consisting of a preformed, stabilized foam into a mixture of portland cement, sand and water.

"The two main essentials of the process," Mr. Jolly says, "are the equipment for producing the air cells and the cell stabilizing material. Years of research has resulted in the development of a simple-operating, compact generator with a single valve for



Aeration of batches requires only a few seconds



Foom is added to the concrete batch in

the accurate blending of air and water in exact amounts, and the foam or cell stabilizing material. This is a harmless colloidal material which provides the stability and toughness of foam necessary for consistent results.

Close Control of Density

"The addition of air cells in predetermined amounts," Mr. Jolly explains, "results in positive control of density within narrow limits. Aerated concrete can now be consistently produced with a density variation of within 1 lb. per cu. ft. Variations under field conditions are not likely to be more than 2 lb. per cu. ft. The process solves the problem of producing a uniform product over the density range of 20- to 100-lb. per cu. ft."

Research scientists, Mr. Jolly says, have experimented with the idea of producing a lightweight concrete by the introduction of air since before the turn of the century. Most of the early experiments involved the addition to the concrete of some gas producing chemical. Current demands for low cost, lightweight insulating concrete, Mr. Jolly believes, have increased the economic importance of such a development.

Mr. Jolly emphasizes the fact that there is nothing complicated about (Continued on page 255)



Lightweight concrete in low density range is easily sawed

21 Reasons why your Block Plant should be Block Plant should be equipped with WIRRAPACS



- VIBRAPACS are made by skilled craftsmen, using the finest precision machine tools available and backed by continuous research and development.
- VIBRAPACS are fully automatic, including front feeding of pallets.
- You get fast, continuous production of high quality block with slow moving cam operation.
- A Unusually low operating cost.
- 5 Undirectional vibration from two 10 hp. high starting torque motors.
- 6 Vibration under pressure of 2000 pounds.
- 7 Instantaneous mold release quick attachment change.
- 8 All sizes and styles of block, brick or tile are made on one set of plain pallets.

- 9 One man off-bears green block and returns empty pallets. No lifting. Off-bearer merely guides the power hoist.
- 10 VIBRAPACS are equipped throughout with anti-friction roller bearings. Assure smooth, trouble-free operation.
- Steel side frames 1 ½ " thick give permanent alignment for all shaft bearings.
- 12 Gravity actuated block moving weights assure smoother delivery of finished block at high speeds.
- 13 New back apron wearing plate has special hardened wearing strip.
- Double arm boom for off-bearing hoist assures perfect balance and ease of control.

- Timken 7½" diameter roller bearings on pallet receiver shaft assure lifetime service.
- Automatic lubrication all bearings fully protected.
- 17 Automatic cam-operated pallet cleaner a built-in feature.
- Automatic height and density control for accurately sized, high-quality block.
- 19 Complete set of tools, mounted on tool board, for servicing machine.
- 20 Single starter for synchronized starting of BOTH 10 hp. vibrating motors.
- All parts made of proper alloy steel are heat-treated for case depth and hardness and 100% inspected.

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Complete Equipment for Concrete Block Plants

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Playgrounds, recreation centers, parks, school yards, patios, back yards—all are prime targets for play construction in concrete and concrete units.

Recreation departments, civic groups, and private citizens will all lend a willing ear when you tell them your ideas for making their children's play time a happier time.

New uses like this for concrete units are *your* answer to more profitable sales. And including Lehigh Cement in your plans is the answer to more profitable production. Remember, there's a Lehigh Cement to help you produce quality units with any manufacturing process.



LEHIGH PORTLAND CEMENT LEHIGH MORTAR CEMENT LEHIGH EARLY STRENGTH CEMENT LEHIGH AIR-ENTRAINING CEMENTS

LEHIGH

PORTLAND CEMENT CO.

Allentown, Pa.

Cellular Concrete

(Continued from page 252)

the production of Aerofill concrete. The foam generator is placed near the concrete mixer. The stabilized foam, resembling whipped cream in color and consistency, is added to the mixer in a carefully controlled amount according to the density desired in the concrete. Since the generator produces the stabilized foam at a rate of 10 c.f.m., desired aeration of batches requires only a few seconds. The resulting Aerofill concrete can be cast in place in the conventional manner, pumped or even placed through a small diameter hose.

Wide Range of Uses

Aerofill concrete is intended for use in fireproofing structural steel members, insulating roof fill, underground pipe insulation, radiant heat floor fill, non-load bearing walls, reinforced wall panels and a variety of other uses. It is easily available in regions where lightweight aggregates are scarce or expensive and under such conditions can effect considerable saving.

Nearly 1,000,000 sq. ft. of Aerofill concrete was specified on projects in the Pacific Coast area in 1954 although the development was not introduced to the industry until March, 1954. Now Aerofill may be produced by either the general contractor under the direct supervision of a field service engineer of Cellular Products Co., or by sub-contractors licensed by Cellular Products Co.

Compressive Strengths

Compressive strengths at 28-days of 6 x 12-in. cement and sand cylinders of Aerofill concrete of various densities were as shown in the following tabulation:

Density lb. per cu. ft.	Compressive Strength (p.s.i. at 28-days	
25	50-150	
30	100-175	
40	100-200	
45	150-300	
50	200-400	
6.5	250-600	
60	300-550	
70	400-700	
80	500-800	
55	600-900	
90	750-1100	
100	1000-1500	

Tensile strength is reported as being within the range of 20 to 25 percent of the compressive strength.

Offices of Cellular Products Co. are at 1238 S. Atlantic Blvd., Los Angeles 22, Calif.

TRANSIT MIX CONCRETE AND FOUN-DATION Co., Beaumont, Tex., has announced plans for building two new ready-mixed concrete plants in Beaumont.

PAVISH CONCRETE WORKS EAST ALTON, ILLINOIS

LEFT TO MIGHT: PAUL PAVISH, L. J. PAVISH, LEO PAVISH, JR.

These men demand



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FULLY AUTOMATIC CONCRETE BLOCK MACHINE

The men from Pavish wanted a machine that would give performance - efficient, economical, trouble-free performance, year after year. That's why they chose Fleming's FMC-180, for a smooth operation at the touch of a button! They wanted the 180 because it produces clean, sharpedged blocks of different heights from plain pallets; because it eliminates the need for an extra man; because it vibrates under pressure; because of its efficient, economical hydraulic power plant. They obtained all these money-making features in the FMC-180 - and you can too - at a cost far less than any other comparable precision-engineered block machine on the market today!



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MANUFACTURING CO. 487 FLEMING AVE.

CUBA, MO. PHONE: CUBA 400 Gentlemen: Please rush complete information, including specifications, prices and terms on the low-priced, fully-outomatic FMC-180 concrete black machine.

Also request information on:

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There's a model Specially designed for Your jobs!

Whether you're loading out aggregates, feeding batchers or crushers, stock piling, or handling concrete, there's a BANTAM to fit the KEY SPOT on that job! Schield Bantam builds just one size machine ... builds more of them than anyone else . . . builds them to do more jobs for you with any of 9 different attachments.

For special applications or routine jobs, there's a BAN-TAM that can do your work faster with more profit for you! Find out about a BANTAM before you buy any 1/6 yd., 5-6-7 ton shovel-crone!

WE HAVE A NEW 7 TON BANTAM

Now, to let you handle bigger lifts, Schield Bantam offers a 7-TON CRANE on Heavy - Duty "300" Crane Carrier! You can also get 5-ton (Crawler) and 6-ton (Carrier and Self-Propelled) cranes to fit your job needs . . . the most complete crane line-up in the % yd. field!

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END INFORMATION ON:	Name	Title
Name of nearest Bantam Distributor New 7-Ton Bantam Crawler Mounted Concrete Bucket Pile Driver	Company	
	Address	
Clam Crane Drag Shovel Back Hoe Backfiller Magnet	Cliy	State

Dual Boiler System Used

(Continued from page 246)

the aggregate from freezing. The units, operating at up to 90 percent recovery, provide great flexibility in that should the weather be milder, only one unit is required, which was the case somewhat last winter. The plant is never completely shut down due to one burner, or control failure, since a standby unit is always available.

Batching is all automatic and contains the latest in weighing equipment. Everything is accessible for one man control, including water line, aggregate and cement batchers.

Some very large jobs have been supplied concrete in this area. Noteworthy among them was the Wyman Gordon new multi-million dollar North Grafton plant. This job took over 100,000 cu. yd. of poured concrete, and was one of the largest single building projects ever undertaken in New England. The foundation for two huge presses, one with a capacity of 50,000 tons and the other of 35,000 tons, each took about 9000 cu. yd. of

The new Worcester plant has been awarded the contract to supply concrete for a public works program in the Lincoln Square area, the total program running into the vicinity of \$8,000,000. Approximately 42,000 cu. yd. of concrete will be poured by Dauphinais. In addition to this construction, the company has supplied similar large projects in the Springfield area.

In addition to the Worcester plant, Dauphinais maintains plants in North Grafton, Wilbraham and Springfield.

Concrete-Coated Pipe

AN UNUSUAL APPLICATION of concrete was made recently in the construction of some 12 miles of steel pipeline placed at the bottom of Lake Maracaibo in Venezuela. The pipeline, playing an important part in a unique secondary oil recovery operation, carries low pressure natural gas separated from the newly produced oil to a \$20 million gas conservation plant located on the lake. There the gas is compressed and injected back into the oil bearing strata underlying the lake.

To prevent the gas lines from floating, the pipe were enveloped with a 41/2 -in. layer of carefully cured concrete, which raised the weight of a linear foot (30-in. pipe) to 562 lb. and produced a negative buoyancy of 15 percent. Following pouring, the concrete was coated with Horncure, a curing compound designed to seal and adhere to the concrete, thereby preventing the almost instant evaporation of moisture before the cement had sufficient time to hydrate.



CHRYSLER with gyrol Fluid Coupling . . . powers the Rocket, saves weight for added payload, protects equipment

Off and running with the new building season is this 41/2cubic-yard Rocket Transit Mixer. It is pouring concrete for a dwelling basement in Youngstown, Ohio.

The operator stands at the controls grouped at the rear of the mixer. Hydraulically controlled chute with aluminum extension enables fast, onto-the-spot discharge. An electrical revolution counter enables operator to regulate mixing action to meet highly specialized requirements. The Rocket Mixer employs a continuous blade design claimed to give faster, more efficient mixing action.

Up front behind the truck cab, the Rocket packs a Chrysler Industrial 30 Engine—part of its standard equipment. Between engine and Chrysler-supplied threespeed transmission is the highly regarded Chrysler gyrol Fluid Coupling. Equipped in this manner, the Rocket Mixer offers its users a 230-cubic-inch displacement engine—an engine with ample power, yet lightweight to permit maximum payloads. Chrysler gyrol Fluid Coupling transmits engine power smoothly, at the same time absorbing shock loads, protecting engine and drive line, adding years to the life of the equipment.

In selecting Chrysler Industrial Engines to power their equipment, manufacturers know they can specify Chrysler Engines factory-equipped to meet their needs. An extra large selection of optional equipment is available for their choosing.

When you offer customers Chrysler-powered construction equipment, you offer them power they know and respect, and you assure them of top performing equipment. Remember that Chrysler Industrial Engines are not expensive. Production-line methods adapted to specialized industrial engine building provide custombuilt engines at mass-production prices.

See a Chrysler Industrial Engine Dealer or write: Dept. 148, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.

> CHRYSLER INDUSTRIAL 30 Engine 230 cubic-inch displacement



Industrial Engines

INDUSTRIAL ENGINE DIVISION . CHRYSLER CORPORATION











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Perhaps you'd like some specific information on what MARCO Idlers can do for you. That's easy. Just request a free copy of bulletin ID-2, today. It tells you about the complete line.



MARCO Model 151 Standard Tubular Frame Conveyor charging dry batch bin in ready mix operation.



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Chicago 6, III.

New Office Building

(Continued from page 245)

the pipe assembly through the use of sawed block and half units. Thus, the need for chases was entirely eliminated.

Flexibility of masonry units again was demonstrated by the recessed lighting which was made possible by using a masonry saw to cut the filler block of the F & A precast system used in the ceilings.

The new office building contains two stories and a full basement. Upstairs are three offices, a toilet room. and a multiple purpose area that will be used for sales meetings, a technical library, and for educational programs. On the main floor are the plan room, auditing room, lobby, receptionist's area, and dispatching room. The basement contains an employes' shower and locker room, utilities room, laboratory, and records room.

One of the most attractive features is a large fireplace in the president's office. This, like the receptionist's counter, was constructed of split concrete units. Their rough texture gives a pleasant appearance and blends harmoniously with the uniform register of the stacked bond walls.

Another unique feature was provided between two of the principal offices where the masonry wall was separated both horizontally and vertically, and translucent glass panels were inserted for communication.

Unusual Concrete Stairway

Of special interest upon entering the building is the free standing, cast-inplace concrete stairway. The upper end of the stairway is suspended from a bridge-like extension of the second floor which spans the two-story lobby section. This span, like both floors and the roof, is constructed of F & A precast joists and filler block.

For the exterior fenestration, the F & A joist system was used in the construction of a canopy which runs the full length of the building proper and extends 20 ft. beyond.

Economy Block Co. is one of the oldest block manufacturing firms in Wisconsin, having been founded in 1921 by Lester E. Schwalbe. Upon his death in 1952, he was succeeded as president by his son-in-law, Wm. R. Menard. Other officers are: Mrs. LaRae Menard, vice-president; A. H. Boelk, director and sales manager; and N. J. Buerger, secretary. The company operates three fully automatic block machines capable of producing 3,000,000 concrete masonry units per year. Michael Krueger is plant superintendent.



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"Quality Concrete" becomes more than a slogan when you use Smith Tilters and Smith Agitators. BOTH these machines are designed to give you the best mix. You can premix or shrinkmix in a Smith Tilter in a fraction of the time needed by any other plant mixer. Your Smith Agitators haul full-rated loads, without a door. © Smith Tilters are made in seven sizes — 1, 2, 3, 4, 5, 6 and 7½ yards; each guaranteed to mix 10 per cent overloads. © Smith Agitators come in six sizes — 5, 6¼, 7½, 9, 10¼ and 11½ yards; each conforms to the Truck Mixer Manufacturers Bureau standards in every way. © Contact your nearby Smith distributor for literature.

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BUILDERS OF BETTER MIXERS FOR MORE THAN 55 YEARS

NOW AN AUTOMATIC RACK LOADING DEVICE



*RACKMAN by GOCORP

RACKMAN AUTOMATICALLY removes green blocks from your block machine and indexes them gently onto the decks of the rack.

RACKMAN AUTOMATICALLY removes empty pallets and returns them to your block machine front pallet feeder. Automatic front pallet feeder may be added as an optional extra with RACKMAN,

RACKMAN AUTOMATICALLY shifts racks. Your lift truck operator merely places racks with empty pallets on conveyor and removes loaded racks.

RACKMAN AUTOMATICALLY removes cured blocks, if you wish. With additional equipment, RACKMAN will automatically remove pallets of cured blocks and convey them to your cubing station as it

indexes green blocks into the rack. Empty pallets return automatically to the block machine.

CONTINUOUS AUTO-OPERATION is provided by RACKMAN keyed directly to the cycle of your block machine. Increases daily production.

AVAILABLE NOW for use with most high-production plain pallet block machines.

NO PITS REQUIRED-RACKMAN is entirely above the floor.

MOST PLANTS have ample room for installation.

TESTED AND PROVED in actual plant installations.

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Concrete Slack Machines both plain and sered pallet types

* Batch Allers - 12.75 cu. R. • Black Cybers • Thip Loaders -
to match misers • Magnold Officering Noises • Other



407 Grace Street

Adrian, Michigan

Ohio Ready Mix Meeting

(Continued from page 250)

marked for state highway work, he said. Special bonds, federal aid, gas and tag taxes, etc., will increase the total to nearly \$700,000,000 available during the coming two-year period for all types of road building throughout the state.

In concluding, Mr. Clarke discussed the weight tolerance bill (H.B. 395), which passed both the House and Senate, but may be vetoed by the governor. This bill, which would permit a tolerance of 1000 lb. over the prescribed axle limits before a penalty or fine is levied, is one of the most important bills affecting the industry, he said, and should be given full support.

Cautions Credit Policy

In a talk "Nothing Finishes Until the Sale is Paid," R. C. Kuhlman, secretary, Lumber and Millwork Association, Cincinnati, stressed the importance of each businessman keeping his house in order creditwise and cashwise by use of safe and sane credit expansion.

To assure payments of debts, Mr. Kuhlman urged producers to make full use of the Ohio Lien Law, which was first enacted around 1920. Under this law the supplier has the right to file with the Loaning Institute notices against mortgage funds (in the case of a construction loan) within 60 days after the last delivery of material.

Tighter Specifications

A general tightening of specifications was reported by J. F. Barbee, engineer, Testing and Research Laboratory, Ohio Department of Highways, in his talk on "Changes in 1955 Concrete Specifications and Possible Revisions." He prefaced his remarks with the statement that over 95 percent of state highway non-pavement work and about 20 percent of the pavement work involves the use of ready-mixed concrete.

Some of the changes follow:

 Allowance of delivery of centralmixed concrete in non-agitating units.

2. Changes from a 6.3 to 6.5-bag mix and from 6¼ to 5¼ gal. of water per bag of cement for Class C (super-structure) concrete work.

3. Reduction of water content (7 to 6.5 gal. per bag) for Class E (substructure) concrete work.

 Exclusion of limestone sand as fine aggregate for concrete wearing surfaces.

Acceptance of masonry cement for manhole construction.

6. Acceptance of portland blast furnace slag cement, provided it meets

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SUPER BLOCKMAKE

A push button starts the cycle during which operations occur automatically in sequence.

Equal delivery of aggregate to the mold box is effected by agitation and mold box vibration assures uniform block density.

A SPECIAL air cylinder-powered press head speeds the cycle and assures blocks of uniform height.

Consistently produces blocks at a rate of 5 or more per minute from any aggregate.

Priced below any machine of comparable performance.

Write today for complete information and learn how easily you can improve your situation with the addition of this unusually simple, compact and efficient machine.

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ABREAST
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A.S.T.M. specification for this type of cement, as an alternate in M-1.7 specification.

7. For Class C concrete, the following reduction in deleterious material content is in effect: total deleterious materials, from 5 to 3½ percent, and shale, coal, and chert, each from 1 to ½ percent. Clay at ¼ percent and soft fragments at 3 percent remain the same.

8. Gravel must be 100 percent crushed for use on all bridge structures.

Regarding future revisions, Mr. Barbee mentioned the possibility of the state requiring separate cement and aggregate storage facilities for state jobs. He thought that ready-mixed concrete trucks may be required to be kept in proper condition (e.g., worn mixer blades would have to be replaced, etc.). A maximum concrete temperature may be included in future specifications, he added. He also thought a cheaper secondary road slab would be effected through a recent revision of specification T-170 which reduces the cement requirements from 61/2 to 51/2 bags per cu. yd.

In his talk on "Labor Negotiations and Trends," J. A. Nicholson, Nicholson Concrete Co., Toledo, discussed the serious truck driver strike currently besetting the ready mix, concrete block, and building supply firms in Toledo. For a full account of this paper, the reader is referred to Mr. Nicholson's series "A Producer Views the Ready-Mixed Concrete Business."

At the annual luncheon, guest speaker Vincent P. Ahearn discussed the Washington scene, commenting on an array of national problems. In reporting the latest developments on the President Eisenhower's multi-billion dollar highway program, he expressed the belief that approximately \$25 billion (over a 10-year period) will be authorized for the program, with the funds coming primarily from increased federal gasoline taxes.



Carl F. Sheaff, outgoing president, left, and J. A. Nicholson, who discussed "Labor Negotiations and Trends"

When increased demand makes plant expansion necessary...





MAINE CEMENT PRODUCTS COMPANY, INC., Pertland, Maine. A complete new plant is being designed and built for this rapidly growing company to produce concrete blocks and other products for the home Building Program. Included in the plant are five storage bins for aggregates; one storage bin for coment; and hendling equipment such as machinary for handling coment, strew and built conveyors and two elevators.

The problem of providing enough cement and concrete for the tremendous building program of our ever-growing economy has focused attention on the need for plant expansion. All over the country concrete plants are turning to Fanning-Schuett for economical additions to existing facilities.

For new plants as well as these expansions, there is a good reason for designing with Fanning-Schuett. Almost a half-century of experience has given Fanning-Schuett a "know-how" which means top efficiency in cement and concrete handling and storage equipment.

FANNING-SCHUETT JOBS IN PROGRESS

STEPHEN'S REDI-MIX CONCRETE CO., Winter Haven, Fla. The demand for concrete has increased in this area to the extent that this company has found it necessary to install additional aggregate handling equipment consisting of elevators and conveyors and, also, a large capacity storage bin for bulk cement together with an elevator and screw conveyor to handle the new bin. Another Fanning-Schuett plant expansion job!

BOREE CONCRETE BLOCK CO., Jacksonville, Fla. This block company in the ever-growing City of Jacksonville is keeping pace with the demand for increased output by adding storage bins and bartching equipment in conjunction with the block making machinery. LAVING SHIPPING CO., Philadelphia, Penna, We are presently installing truck leading facilities and storage bins fer handling Iran are at this company's Wilmington and Camden Marine Terminals.

DELYAN BLOCK COMPANY, South Williamsport, Penna. To increase its output of concrete blocks, this company is adding a new mixer, and additional storage bins and batching equipment.

SUPERIOR BLOCK CO., Winter Haven, Flo. This growing company in the concrete block and products business is installing a storage bin and machinery for bulk cement with a capacity of over 600 barrels. All Fanning-Schuett equipment,

FANNING-SCHUETT 4325-39 NORTH THIRD STREET



ENGINEERING COMPANY

Labor Negotiations and Trends

(Continued from page 248)

volume of business. No ready mix producer can afford to buy all the labor proposals that come his way.

The skyrocketing wages and additional fringe benefits have helped few ready-mixed concrete producers. Are your unionized men doing better work? Are they making more deliveries per day? How many of us can honestly say that the union has made a single contribution toward a smoother operation of our business? We can be reasonably sure that no new union demands will contribute to the financial security of concrete producing companies. We also can be reasonably certain that at each contract negotiation, we will be pressured into accepting new demands regardless of the disastrous effect on our businesses.

There are trends that you and I may find necessary to resist, even to the point of accepting a strike. Can a seasonal business such as ours, whose volume of orders and amount of labor hours are almost entirely dependent on the day's weather, consent to a four weeks' vacation — a guaranteed 8-br. day — or a guaranteed 40-br. week? Can our industry that annually faces a sizable winter operating loss

take on a pension plan; a guaranteed annual wage; shorter work weeks; or a full week's pay when a driver is ordered in for a day or any part of a week? How many ready-mixed concrete producers can afford to guarantee 90 percent of their drivers 40 hr. per week on a year round basis? Yet, these are demands that the Teamsters Union is already throwing at some of their labor contract customers.

Trend to State or Area Bargaining

There is one apparent trend that bodes ill for all ready-mixed concrete companies. The Teamsters seem to be determined to bargain on a state-wide basis or more preferably, on an area-wide (a number of states) arrangement. The labor contract thinking of Dave Beck, Teamsters' president, seems to pattern John L. Lewis' ideas. The rugged, regional demands annually made by Lewis, crippled the coal industry. Beck's plans for area-wide bargaining could ruin a good many concrete producers.

Under the Beck program, regional officers will "call the shots." Local leaders who are not cooperative will be replaced. Within a given region,

the contracts with all producers (big city and village alike) will be quite similar, if not indentical. Within a region, all ready-mixed concrete drivers of a given type and size of equipment will get approximately the same wages and benefits regardless whether they live in Cleveland or in a small Southern Ohio town. Economically this doesn't make sense, but it's certainly the proposed pattern.

In my book, there are several conditions or developments that might stymie Beck's plans for complete control of ready-mixed concrete deliveries:-(1) lack of cooperation (including even personal resistance) by highly considered local union officials; (2) the recognized weakness of unions in small communities where public opinion will rally behind local producers in their efforts to resist the union plan; and (3) full cooperative effort by all ready-mixed concrete producers in each and every part of the United States where the union tries to set up a pattern.

Unfortunately for our industry, too many producers are simply not alert to the pattern plans of the Teamsters. I'm certain that Toledo building supply companies are now cognizant of the problem. In fact, some management representatives conjecture whether they will have another opportunity to



Mobile-Mobile Batching Plant on the job ready to pour concrete for aprons and runways on Air Force base.



Noble-MOBILE is a complete plant . . . fully portable with either semi-automatic or full-automatic cement and aggregate batching systems. Cement is batched into center compartment of a two yard weigh hopper. Output capacity is 60 yds. or more per hour. Also can be equipped with full-automatic triple batcher.

Consult our engineers today for additional details. Write, wire or phone. DESIGNERS AND BUILDERS
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negotiate a local contract. I'm equally certain that the Teamsters won't give up their pattern plans as long as they feel they can put them across. We certainly know that within three years "over the road" haulers have been forced into area-wide contracts. What are ready-mixed concrete producers doing to prevent such a disastrous twist in their labor negotiations? Believe me, such a twist is a strong possibility. The Teamsters have an unexpressed plan to negotiate a master

Producers who belong to the National Ready Mixed Concrete Association can get valuable information on labor negotiations from Vince Ahearn, executive secretary, and Charles A. Horsky, counsel for the Association. Some state associations have labor committees that are doing a fine job. The work of the California Associations is an outstanding example. Ahearn, Horsky, and a number of state association secretaries are keenly alert to the pattern problem. Unfortunately, a majority of producers do not belong to any associations. The trouble is with the average producer who, in the first place, is never prepared to negotiate a contract and then after he is finally forced into a settlement, forgets labor problems until the next expiration date of his contract.

UNION PROPOSAL ON LEASED EQUIPMENT - demanded in TOLEDO LABOR CONTRACT NEGOTIATIONS.

ARTICLE XXVI. LEASED EQUIPMENT

ARTICLE XXVI. LEASED EQUIPMENT

1. For the purpose of protecting the established drivers' rate, minimum restal rates for the leasing of equipment owned by employee shall be determined by negotiations between the parties, in each locality for the equipment used in that locality.

2. In the event the Company leases equipment from individual owners, then in that event the Company shall pay the driver directly and separately from the lessor of said equipment.

3. The Employer expressly reserves the right control the manner, means and details of, and by which, the owner operator performs his services, as well as the ends to be accomplished.

If you don't believe that a pattern is coming your way, take a good look at the leased equipment clause that will probably be in your next union proposal. The one that the Teamsters demanded in the Toledo negotiations (see Toledo proposal on leased equipment, above) came from the Midwestern "Haulers" contract. Through the use of leased equipment, a number of ready-mixed concrete producers felt they were being able to partially avoid some of the hardships of harsh, unreasonable labor clauses. The union is determined to eliminate the possibility of any such loopholes and is pushing to completely control leasing arrangements - even where state laws seem to stand in its way.

An individual producer, confronted with a tough leased equipment clause or other unreasonable pattern demands, needs help. One misstep in labor negotiations by a single producer can cause serious consequences for all others in the industry. Vince Ahearn and other association leaders have been and can be of tremendous assistance. Nevertheless, the only real solution to our labor problem is for concrete producers everywhere to work together as a unit.

The Teamsters are on the march. Your plant may be their next stop. It will pay you to be ready. You can be ready only if all of us work together in common effort.

Build Gravel—Ready Mix Plant

ART BARBER, JR., AND WILLIAM RICHTER have built a new combined sand and gravel and ready-mixed concrete plant at Granite Falls, Minn., costing \$100,000. It was opened for public inspection late in April. The aggregates plant, incorporating a primary crusher and a rinsing screen, produces five grades of sand and gravel. Water for washing is obtained from a nearby river. Tailings from washing operations are pumped to a settling basin and the water held for two weeks before being returned to the river. The ready mix plant, supplied by Erie Strayer Co., consists of a four-compartment aggregates and cement bin.

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NOBLE TRIPLE BATCHER PAVING PLANT

OFFERS YOU...TRIPLE SPEED ... TRIPLE ACCURACY...TRIPLE CONVENIENCE

Speed because . . . one single batch plant can be used for paving jobs formerly requiring dual or two-stop plants. Batching time is reduced, concrete produced at a rate exceeding any other portable plant.

Accuracy because . . . cement, fine aggregates, coarse aggregates are each weighed on separate scales SIMULTANEOUSLY! Accuracy meets and surpasses State and Government Agencies' most exacting specifications.

Convenience because . . . easy unit break-down of plant for truck transportation, without highway permit, makes loads not over 8 ft. wide. Simple, fast erection with either timber supports or concrete footings.



Photo A—This view shows batcher with 150 ton — 4 compartment aggregate bin. Batch silo capacity 900 cu. ft. Storage silo capacity 2300 cu. ft.

Photo 8—Center Section view show-ing the triple-automatic scale beam cabinet with operator's controls mounted in the center directly under the cement scale indicator.

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Florida Ready-Mix and Block Group Holds First Meeting

FLORIDA CONCRETE AND PRODUCTS Association, Inc., Winter Park, Fla., successfully launched its first annual convention on June 13 and 14 at the Fontainebleau Hotel, Miami Beach; attendance totalled 82. Officers and directors elected for the coming year were William Hicklin, Jr., Capitol Concrete Co., Jacksonville, president; Neilson Jones, Maule Industries, Miami, first vice-president; P. Ernest Kilgore, Pinellas Industries, St. Petersburg, second vice-president; Frank Williamson, Holloway Concrete Products Co., Winter Park, secretary-treasurer; and Paul Lenchuk, executive secretary.

The following were also elected directors: Douglas Cone, Tampa; Connie Zimmerman, Lakeland; Robert Eglehoff, Pensacola; Allan Gay, W. Palm Beach; W. D. Gillis, Ft. Lauderdale; George Goetz, Ft. Myers; Tom Kearns, Hollywood; Marion King, Jacksonville; C. L. Needham, Bradenton; Hugo Quillian, Daytona Beach; and Charles Denny, Gainesville.

Featured speakers at the Florida meeting were Stanton Walker, N.R.M.C.A. director of engineering, who discussed "Quality Concrete," and William Markert, N.C.M.A. sales promotion director who talked on "Effec-



Officers of the Floride Cencrete and Products Association, Inc., elected for the coming year are (left to right): Neilson Jones, Milami, first vice-president; William Hicklin, Jr., Jacksonville, president; Paul Lenchuk, executive secretary; Fronk Williamson, Winter Park, secretary-treasurer; and P. Ernest Kilgore, St. Petersburg, second vice-president

tive Promotion and Merchandising of Concrete Masonry." Mr. Walker pointed out that the association can contribute much to improving building codes and specifications which in turn would help in bringing about quality concrete. Mr. Markert discussed the promotional work of his association, and showed slides of the Yucca Flat atom bomb test on concrete block and precast concrete houses.

Other guest speakers were William

Gove, E.M.C. Recording Corp., St. Paul, Minn., and Charles Martensen, manager of the trade association department of the U. S. Chamber of Commerce.

During the board of directors business luncheon meeting, Mr. Williamson was appointed chairman of the educational committee charged with developing an educational program for producers at various Florida universities.



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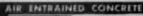
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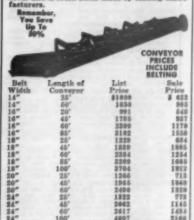


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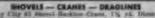
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